

SCIENCE.

FRIDAY, DECEMBER 24, 1886.

COMMENT AND CRITICISM.

IT SEEMS A PITY that wealthy men who bequeath money to colleges cannot trust the authorities to expend the legacy in the way most beneficial to educational interests. Nearly every rich man who leaves any thing to a college seems to deem it essential that he indicate how it shall be expended, and the channels of expenditure selected are by no means always well chosen. While Mr. Greenleaf, the Boston hermit, who recently left nearly the whole of his large estate to Harvard college, made conditions that are more rational than usual, yet it is probably true that the president and fellows of Harvard could have used the five hundred thousand dollars — if it prove to be so much — with more benefit to education and in satisfaction of what are the more pressing wants of the college, had they been untrammelled by any testamentary conditions. The foundation of new chairs, the increase of the salaries of poorly paid instructors, the construction of some new laboratory, — all suggest themselves as being what Harvard probably needs most. The foundation by Mr. Greenleaf of ten undergraduate scholarships of an annual value of three hundred dollars each, is an excellent thing; and they will, beyond a question, be the means of affording a liberal education to young men who could not otherwise secure it. It may be that Mr. Greenleaf has left his money with fewer conditions than are now reported, but in our view it would have been better had he left his money without any conditions at all. The president, faculty, and trustees of a college are the proper persons to decide most intelligently what the institution needs most.

IT VERY FREQUENTLY occurs that among the advertisements in English educational and literary papers are to be found some calling for applications for vacant chairs in leading educational institutions. Owens college, Manchester, and the leading colonial universities, frequently advertise in this way. As with us this never happens, the practice of advertising being restricted to schools and small colleges, it seems odd to read these

advertisements. We cannot help imagining the result that would ensue were it extensively advertised that applications were wanted for the chair of history at Harvard, of physics at Columbia, or of Latin at Yale. Without any advertisement, a vacancy in the faculty of a leading American college not long ago, called forth forty applications from this country and from England, many of them coming from men of eminence in the scholastic world. In selecting a professor from that number, the trustees were driven nearly crazy, and no one can predict the result had applications been solicited by advertisement. Which method is the better for the institution is the important question, and we have no hesitancy in saying that we believe nothing is lost by our habit of not advertising. In the case of all our principal colleges, it is undoubtedly the fact that the president and trustees keep their eyes continually open, and when a vacancy occurs they are pretty sure to know who is the best man for the place; or, in any event, they have made up, unconsciously, a short list from which the selection is to be made. It is to be urged, too, in favor of not advertising, that governing bodies thus escape the importunities of individuals in no way fitted for the position to be filled, but who put in an application in the hope of bettering their condition.

THE QUESTION AS TO the necessity or advisability of retaining corporal punishment in schools as a means of discipline is by no means settled. The majority of the authorities undoubtedly favor its abolition, but a strong minority are contending for its retention. At the last meeting of the German-Austrian teachers' union, a vigorous debate took place on this subject, being precipitated by the report of a special committee in favor of retaining corporal punishment as a last resort in cases of malicious wantonness, obstinate defiance, disobedience, falsehood or dishonesty. Dr. Dittes, a lifelong student of pedagogy, opposed the resolutions as embodying a great pedagogic error. He said that if, as claimed, its re-introduction into German schools was necessary, the logical conclusion must be that the German youth and nation rank, from a moral stand-point, below the French,

in whose schools discipline was good, though no corporal punishment was allowed. Dr. Dittes insisted that the school must not be made a house of correction. The voting on the resolutions seems to have been attended with much confusion, as the result is disputed. The final figures given were, for the adoption of the resolutions contained in the committee's report, 181; against their adoption, 168. The Austrian papers condemn the teachers for adopting the resolutions; and the *Neue freie presse* of Vienna went so far as to say that this public confession by Austrian teachers, that they cannot accomplish their high task without the use of the rod, is proof that the main problem to be solved is not how to reform the education of children, but how to reform the training of teachers.

IN NEW YORK CITY, Mayor Grace has followed up his excellent appointments to the school board by a letter addressed to that body on the subject of industrial education in the schools. Mayor Grace is of opinion that now is an exceptionally favorable time for the establishment and equipment of an industrial school for girls, because the normal college is in what may be termed a 'state of congestion'; hundreds of applicants who have demonstrated their fitness by obtaining the percentage required on examination, being turned away every year owing to lack of accommodation. Mayor Grace's idea is, that an industrial school can now be established in which young women may be taught such special branches as phonography, telegraphy, book-keeping, cooking, sewing, and type-writing. Admission to this school should be from the various grammar-schools throughout the city, and thus the overpressure at the normal college would be relieved. This school could be made to serve as an experiment, and upon its success would probably depend the future introduction of industrial education upon a more extended scale. By way of practical advice, the mayor recommends the board of education to apply to the board of estimate for an appropriation sufficient to start such a school, and promises his own vote and voice in favor of granting such an application if it is made.

THE GERMANS HAVE been forming a modern-language association similar to that in existence here, and of which the fourth annual session is to be held next week. About one hundred and fifty

professors and teachers met at Hanover and organized as the *Verband der deutschen neuphilologischen lehrerschaft*. The same conditions seem to prevail abroad as here, for we read in *Modern-language notes* that at the Hanover meeting pretty much the same wailings were heard about the defects of pedagogic methods, the preponderance of the classical element in the schools, and the necessity for organization, as went up from the assembly by which the American modern-language association was formed. But modern-language teachers seem to disagree widely among themselves as to method, as any one can learn by reading discussions on the subject, such as that lately printed in the *Academy*, the excellent journal published by the associated academic principals of the state of New York. If they are to carry on a vigorous attack against the methods of classical instruction, they must themselves present a united front, and come to a definite agreement as to how modern languages can be best and most expeditiously learned. We very frequently hear complaints from university professors that they are greatly crippled in teaching their subjects, because the men who come up to them in junior, senior, and graduate years, although they profess to have studied German and French, cannot use French and German authorities and books of reference. This certainly is wrong, and should not be suffered to continue; and it is our instructors in modern languages to whom we must look for a change. Our own firm conviction is, that, at the present stage of scientific and literary study, a student entering the junior year of his college or university course should be able to read French and German fluently, and understand them readily when spoken, if he is to gain the fullest benefit from the last two years of his course. And this knowledge will, we believe, be best secured by making the ability to read one of these two languages a condition of admission to the freshman class, and making the study of the other, with the express aim of learning to read it, compulsory during freshman and sophomore years.

AT THE PHILADELPHIA meeting of teachers of preparatory schools, of which we print an account elsewhere, President Magill of Swarthmore college made an acute comment on Professor James's paper on the professional training of teachers. He said that chairs of pedagogy in the colleges would not be of much avail if women, who are generally

excluded from the colleges, are to form as large a proportion of the teachers as heretofore. In 1880 the census showed that 154,375 of our 227,710 teachers were women, and the proportion has not been materially altered since. The problem is, how to train these female teachers, quite as much as how to train their colleagues of the male sex. And the training of female teachers is of especial importance, because they are very generally the teachers of primary schools and kindergartens; and their pupils, being at the most tender and impressionable age, require the most careful attention and training.

Of course, two ways for avoiding the difficulty indicated by President Magill suggest themselves. The first, and the one that he probably had in mind, is the opening of colleges to women on equal terms with men. The other is to provide all female colleges, training and normal schools, with competent instructors in the history, theory, and practice of education. The former method is the more likely to arouse opposition, while the latter requires the greater pecuniary outlay; for, if a professor is attached to a college already, he can just as easily teach women as men. We fancy that President Magill's point is one that has escaped the attention of most of our educational reformers.

THE PRESENT STATUS of the gymnasium and realschule controversy in Prussia cannot remain long unchanged. The gymnasial students have too many unfair advantages; and because of this, and despite the excellent and practical character of the education given in the realschule, there are to-day in Prussia 257 gymnasia, as against 89 realschule and 14 higher realschule. The desire to limit the military service of boys holding certificates from these schools to one year, is the single point on which all the controversialists agree. Those who desire to equalize matters, and deprive the gymnasia of their privileges, point, and forcibly too, to the fact that only one-fifth of the pupils from the gymnasia pursue their studies any further, the rest falling back to inferior posts, or going into a business career. Moreover, until the re-organization of 1882, it was necessary that a boy's path in life should be chosen for him at the absurdly youthful age of nine; and now, since the first three years of the curricula in the gymnasium and real-gymnasium have been made identical, this choice is only postponed until the age of twelve, still far too early.

There are two ways of escape from the difficulty: more of the two courses may be made identical, or a new sort of school shall be devised to take their place. Prevalent opinion favors the latter alternative, the idea of an *einheitsschule*. Some of the teachers in the real-gymnasia have expressed themselves in favor of some such plan as this. The school-life should be unified by providing, that, after a preparatory course of three or four years, a six-years' course shall follow, made up of instruction in German, religion, drawing, arithmetic, geometry, history, geography, and, during the first three years, physiography and either English or French; in the second three years, mathematics, natural science, and a second modern language or Latin, according to circumstances. On completing such a course satisfactorily, the pupil should have the right to the one-year military service. Then, after all this, the plan provides for two parallel courses of three years,—one based on the classics, and one on modern languages and science. After all the absurd things that have been said in Prussia and elsewhere on this subject, it would be somewhat of a surprise to see so excellent a plan as the above adopted as the outcome of it all.

AMONG THE VARIOUS branches of technical instruction that are coming to occupy a very important place in our educational system, instruction in architecture is certain to claim for itself considerable attention. Architecture, affording as it does scope for the exercise of both speculative and practical temperaments, is very attractive to that numerous class of minds which combines imaginative power with constructive ability. Moreover, we must remember that certainly a quarter of a million of buildings are erected in this country every year, and the tendency is to obtain trained architects to design them and superintend their construction. For all of these reasons, information concerning instruction in architecture is of interest and value. There are only four schools of architecture in the United States, none of them long established, and therefore our sources of information concerning methods of instruction are limited. But in a recent number of the *Sanitary news*, Professor Ricker, of the chair of architecture in the University of Illinois, has a paper on architectural education which is very suggestive, because, instead of being a theoretical dissertation, it is a simple account of how he conducts the

work of his own department. Professor Ricker finds that his work naturally subdivides itself into four classes.

The first of these classes comprises the university work proper, consisting of the methods employed and the instruction imparted in the technical classes. The second embraces the general supervision of the courses of instruction in shop practice, arrangement of course of study, problems, etc. The third covers the supervision of the commercial work of the university, comprising superintendence of work and contractors, the making of estimates, drawings, specifications, etc. The fourth is the supervision of the blue-printing laboratory. The course in shop practice offers some points of interest. It is arranged throughout on the Russian system, which Professor Ricker believes to be productive of better results than the Woodward system, which has been adopted in the training-schools of St. Louis and Chicago. At the University of Illinois no attempt is made to compel all the members of a class to do each part of the work in exactly the same time, for Professor Ricker holds that practice and competition will make a man rapid in execution soon enough, the first essential being to teach him how to work in the best manner, no matter how long it takes him. By adopting this system, each student is treated as an individual, and not as a member of a class; and bright and quick pupils are not kept back, nor are the slower ones urged on at the expense of thoroughness. Professor Ricker's equipment consists of benches and sets of tools for twenty-four students, the maximum number that he thinks an instructor can profitably take charge of.

DR. CUNNINGHAM, the successor of the lamented Principal Tulloch at St. Andrews, opened his classes in divinity with an address of great power and lucidity. After a glance at the past and a glowing panegyric upon his predecessor, Dr. Cunningham took up the subject of his chair and expounded with unusual clearness his conception of it. He said that at the outset he must answer the question, 'Is theology a science?' If it is a science, then it should be welcomed within every university, and taught with the care bestowed upon the other sciences; but if not, if it is a mere feeling or belief without any foundation in reason, without any capability of being reduced

to logical forms, then it ought to be banished from every university as something alien to their spirit and design. Dr. Cunningham then proceeded to vindicate for theology the rank and title of a science. While it was largely dependent on metaphysics, on psychology, on moral philosophy, and on anthropology, yet it had facts of its own, gathered from both the material and mental worlds; which facts can be gathered into a system, and reasoned upon in a scientific way. This being true, it follows as a corollary, the speaker continued, that theology should be treated as a science, studied as a science, and taught as a science, freely and fully; not as a system of foregone conclusions, but as a subject capable of advancement, and therefore to be looked into, speculated upon, and brought into harmony with the widening knowledge and highest thinking of the age. If the chemist, astronomer, or physiologist were bound to teach his science according to the beliefs of the chemists, astronomers, or physiologists of a century, or two centuries, or ten centuries ago, his teaching would be a laughing-stock, and his chair driven from the university as unworthy of it. Similarly the professor of theology must be allowed free scope, and not tied down to theology as it was taught two hundred and fifty years ago. Dr. Cunningham's address was on a high plane, and, if it is a fair measure of the character of his university teaching, the latter cannot fail to be successful.

LONGEVITY OF PRESIDENTS OF THE UNITED STATES.

OF the men who have retired from the office of President of the United States, only one now lives. During the last year of Grant's administration, none at all were living; and hardly at any time within the memory of the younger generation have more than two or three lived at the same time. The inquiry naturally suggests itself, whether the men who have filled this office have really less viability than other men of their class, and especially whether a comparison with the tables of mortality justifies the conclusion that in recent years the mortality among them has been remarkable.

To furnish data for investigating this question, I have prepared the following table, showing the years of birth, accession, and death, of all the Presidents. The column following the year of death shows the age at which each President assumed his office. It is formed by subtracting

the year of his birth from that of his accession, and is therefore liable to no error greater than a fraction of a year. Following this is the expectation of life at the epoch of accession as deduced from the 'combined experience' table of mortality. This expectation is taken in the usual way, as the number of years after which it would be an even chance whether the individual was living or dead. Although this is not a mathematically rigorous definition, yet in the case under consideration it differs from the rigorous one only by an amount too small to be worth consideration. Following this is given the number of years which the incumbent actually survived after entering upon the duties of his office.

	Born.	Became President.	Died.	Age at accession.	Years of life.	
					Expected	Actual.
Washington.....	1732	1789	1799	57	16	10
Adams, J.....	1735	1797	1826	62	12	29
Jefferson.....	1743	1801	1826	58	15	25
Madison.....	1751	1809	1836	58	15	27
Monroe.....	1758	1817	1831	59	14	14
Adams, J. Q.....	1767	1825	1848	55	15	23
Jackson.....	1767	1829	1845	62	12	16
Van Buren.....	1782	1837	1862	55	17	25
Harrison.....	1773	1841	1841	68	9	0
Tyler.....	1790	1841	1862	51	20	21
Polk.....	1795	1845	1849	50	21	4
Taylor.....	1784	1849	1850	65	11	1
Fillmore.....	1800	1850	1874	50	21	24
Pierce.....	1804	1853	1869	49	22	16
Buchanan.....	1791	1857	1868	66	10	11
Lincoln.....	1809	1861	1865	52	20	4
Johnson.....	1808	1865	1875	57	16	10
Grant.....	1822	1869	1885	47	23	16
Hayes.....	1822	1877	—	55	—	—
Garfield.....	1831	1881	1881	50	21	0
Arthur.....	1830	1881	1886	51	20	5

Omitting the only living ex-President, and taking the sums of the expected and of the actual years of life in the case of all the others, we find them to be:—

Total years to have been expected . . . 331
Actual years of life 281

If we omit the two abnormal cases in which a President died by assassination, the result will stand:—

Years to have been expected . . . 289
Actual years 277

If we reasoned from this general result alone, we should conclude that Presidents were not, as a class, less viable than the average of other men, since the difference of twelve years between the actual and expected sum total of life might well be the result of chance. But a more minute analysis of the table will show a feature which, taken in connection with the historical facts, prevents us from disposing of the subject in this

summary way. Of the eight Presidents up to Van Buren inclusive, all but one lived out the full term of life allotted them by the tables, the single exception being Washington. On the other hand, of the thirteen men who have held the office since Van Buren, all but four have died before living out their allotted term. This fact raises the question whether we can attribute these premature deaths to the more arduous nature of the duties which the President is now called upon to perform. From this point of view, the dividing line would not be between Van Buren and Harrison, but rather between John Quincy Adams and Jackson, because it was under the latter that the change in question took place. Perhaps we ought to introduce a third epoch with the civil war. Making such a division, and omitting the cases of Lincoln and Garfield, the exhibit, which seems to show a total deficit of 53 years since Jackson, stands thus:—

	<i>Expected years.</i>	<i>Actual years.</i>
Washington to Adams . . .	87	128
Jackson to Buchanan . . .	143	118
Johnson to Arthur . . .	59	31

Notwithstanding the color thus given to the view that the modern President is liable to be broken down by the duties of his office, it must be considered, that, taking these numbers as they stand, the number of cases is too small to sustain such a conclusion. There is, however, another circumstance to be considered. It is a well-known fact that the tabular expectation of life has been considerably exceeded in the general average of men who, during the present generation, have insured their lives. How great the increase is, cannot at present be exactly stated, but I do not think that it is less than one-fourth. It will also, I think, be conceded that all who have acceded to the presidency have been men with good insurable lives. If, now, we increase the expectation of life by one-fourth in the last two lines above, we shall have a decidedly greater discrepancy: namely, expected years, 252; actual years, 149. If it were allowable to include the cases of Lincoln and Garfield, which are omitted in this comparison, the discrepancy would be greatly increased.

While the danger of assassination has undoubtedly been greatly lessened by the deserved fate which the two assassins of Presidents met, I do not think we can consider it as a vanishing quantity. I think assassination should be regarded as a real danger to which a President is subject, and that a prudent life-insurance company would consider that fact in deciding upon an application for insurance.

Since, even when we admit the case of assassination, there is a large falling-off in the years of life, the question presents itself, whether this is due mainly or wholly to the arduous character of the duty which the President is called upon to perform. Of course it is impossible to answer this question from statistics: in fact, it must be admitted that the above summary does not prove the diminished viability of the class under consideration to any greater extent than to render it somewhat probable. Statistics can at the present stage do nothing more than disprove or substantiate *a priori* conclusions from physiological considerations. If we eliminate from the statistical results the probable effect of the lack of out-door recreation, as well as the lack of incentive to adopt that regimen best suited to a sedentary life, we shall probably find no such discrepancy as would justify the view that a President is liable to die from the arduous character of his duties. S. N.

THE SCHOOLMASTERS' CONVENTION AT PHILADELPHIA.

In answer to a call issued by the heads of prominent preparatory schools in or near Philadelphia, more than one hundred teachers engaged in preparing boys for college assembled on Nov. 26 in the building of the University of Pennsylvania at Philadelphia. The address of welcome was given by Dr. Pepper, provost of the university, who laid great stress on the waste of time and energy caused by the sudden break between school and college. He said that to devise means to fill up this gap, and make the preparatory school an organic part of the education that ends in the college or university, was the object of the convention.

Professor James of the University of Pennsylvania made a strong plea for the technical education of teachers. The teacher's position should be considered as an end in itself, not as a stepping-stone to more permanent employment. In Germany this requirement was fully recognized. There, with few exceptions, the teachers have received a technical training, the result of which was to give them not only some information which they could impart to their pupils, but also some knowledge of how to impart it. They are acquainted with the history of education, know something of the long line of thought of which they form a link, are taught what their place in the existing educational system is and how they can best fill it. The one method and the best method of elevating the teaching in this country is to make teaching a real and an honorable profession. For this purpose the teachers must be

trained to be teachers, and an essential part of this training is the study of educational history and systems.

Mr. MacAlister, superintendent of public schools of Philadelphia, warmly upheld Professor James's position, and testified as a man of practical experience to the value and efficiency of the study of pedagogy as a science.

At the session on Nov. 27, Professor West of Princeton college presented an admirable paper on the question, 'How to improve our classical training.' The classics have just survived a severe attack, and for the time being there is peace; but a second attack is sure to come, and the problem is to take such steps as will enable an effective answer to be made to it. To do this, we must improve the teaching of the classics. The classics are attacked because they are poorly taught. There is no method, or at least no rational one. In order to get a rational and elastic though definite method, it is necessary to consider the nature of classical study, the condition of the student, and the end to be gained. The problem of teaching the classics is a unique one: there is more in it than the language drill, more than the compliance with the requisites of a liberal education. It includes nothing less than the opening up of a new world: it is an embodiment not only of Greek and Roman history, but of the national history of Greek and Roman thought. The end of classical training is to enable the student to feel at home in this world, and to appreciate it. To do this, no doubt a certain amount of literature must be sacrificed and dissected in acquiring the technique. But that is simply preparatory: when it is over, then the real study of the classics begins. The main difficulty in realizing this method of teaching the classics is the lack of teachers who really know them. Teachers trained as teachers, and trained as classical scholars (not necessarily as philologists), would soon show the real educational value of classical study, and give the best possible answer to those who question its usefulness.

The next session was held at Haverford college, and was devoted to the discussion of the relation of the fitting schools to the colleges. The discussion was quite a general one, and included the questions of admitting to college on certificate from the heads of schools; the advisability of having a preliminary examination a year before entrance on elementary subjects; the uselessness of petty conditions, and the abuses of this method of admittance; and the necessity of recognizing the various interests of candidates in the entrance examinations. The discussion showed how generally the faults of our college system are felt by

the schoolmasters, and how anxious they are for changes to be made.

A constitution was adopted by the teachers present, and it was decided to hold quarterly meetings. The Rev. Dr. Robins was elected president, and Mr. George F. Martin, secretary.

The meeting was eminently satisfactory, and the organization has come to fill a real want in our educational system.

PHYSICAL EDUCATION.

THE American association for the advancement of physical education held its second annual meeting at the Adelphi academy, Brooklyn, on Nov. 26. This association was organized one year ago under the auspices of such well-known men as Professor Hitchcock of Amherst, Dr. D. A. Sargent of Harvard, Dr. Hartwell of Johns Hopkins, Mr. William Blaikie, and others. By the terms of its constitution, it consists of active members who are directly engaged in physical education, of associate members including all who are interested in the cause of physical education, and desire to be associated with the society, and of honorary members, who shall be well known as patrons of the cause of physical education. Its membership is nearly one hundred, and is constantly and largely increasing. The general interest which it has aroused is shown by the fact that delegations from various societies throughout the west, including St. Louis and Milwaukee, were present, and took an active part in the proceedings. At the opening of the session, Mr. Charles Pratt read an address of welcome, in which he said that the ten thousand teachers of New York and Brooklyn had one of the most magnificent promenades in the world, and that, if they would walk the length of the Brooklyn bridge both ways every day, their health would be much benefited. He would have every one sign a pledge that he would solemnly observe all the laws of health, and do what he could to lead others to do the same. He believes that if each individual should take proper care of himself, not only in matters of exercise, but in other respects, the work done in five hours would be of more value than that now done in ten. Prof. E. Hitchcock of Amherst college followed with a paper on 'The need of anthropometry in physical training.' From the earliest times an effort had been made to establish some foundation upon which observations could be scientifically made. Such an attempt could be traced back to India. The same was true of the Greeks. Thus we have the various systems, some regarding one foot of the height as a standard, and others the length of the hand and the vertebrae. The basis of all

must be a knowledge of the human body, what it can do, its various temperaments, and how it can be kept up to the most perfect condition. The largest men are not necessarily the men who can endure the most fatigue, or who best resist disease. Into the problem many things enter, — the pedigree, including parents and grand-parents; did they live to old age, and did they die of disease or accident? what is the condition of the individual's heart? of his lungs, his eyes, his ears? It is a very difficult matter to ascertain just what a typical or ideal man should be, and therefore it is difficult to select a standard of comparison. The author thinks, however, that the height of individuals is the best basis, and would suggest a centimetre or one-half inch as the unit for charts of anthropometry. At Amherst accurate measurements are taken of each student who enters college; and these are repeated occasionally, so that now there are records of one thousand students. It is the practice at this institution to examine each man with great care, and to advise him as to the exercise which he should take. Professor Hitchcock, in closing, said that every instructor should take such measurements, and be satisfied with simply recording them. The data which we have now are very crude and incomplete, and no deductions can be made from them. We must continue our observations as opportunity offers; and, though we may not live to obtain much that is practical from them, let us nevertheless do our work accurately and well, that succeeding generations may profit from what we have done. The next paper on the programme was 'The physiology of exercise,' by E. M. Hartwell of Johns Hopkins university. Dr. Hartwell laid great stress on the point that exercise had more in view than the simple development of muscle. While this was in a sense important, it was only half the truth. Proper exercise trains the nerve-centres, the brain and the spinal cord, as well as the muscles. And this is exceedingly important, and should never be lost sight of. The following papers were read at the afternoon session: Physical training of public school children, by W. C. Joslin of Staten Island academy; Educational gymnastics, by Prof. Carl Betz of Kansas City, Mo.; German system of training teachers at the Milwaukee normal school, by C. G. Rathmann, St. Louis, Mo.; and Physical training from a medical stand-point, by A. M. Starkloff, president N. A. Turnerbund, St. Louis, Mo. Very interesting exhibitions of gymnastics were given by classes from the Brooklyn normal school of physical training, the turnvereins of New York and Brooklyn, and the Adelphi academy.

GEOGRAPHICAL NEWS.

M. DE LESSEPS, on his arrival at Paris, reiterated the assertion that the Panama canal will be opened in 1889, "even if the most difficult part of the cutting is not then complete." He added, that the portion then navigable will demonstrate that the original calculations were well founded.

The latest rumors about the Kongo are, that the station at Stanley Falls (the highest station established by Stanley) has been abandoned, owing to the continued hostility of the Arab slave-traders.

English capitalists having definitely decided to have nothing to do with the proposed Kongo railway, it is stated that a committee has been formed in Brussels to proceed to the Kongo and decide upon the feasibility of the project on the spot.

There are so many travellers now exploring the central portion of Asia, that it is extremely difficult to keep track of them. Dr. Radde arrived at Sarakhs on the 22d of July, after a successful journey through the now familiar regions of Merv, Penjdeh, Meruchak, Zulfikar, Askabad. Thence he repaired to Tiflis, where he arrived in the early part of September. As might have been expected, he suffered severely from the heat.

Two Frenchmen, MM. Capus and Bonvalot, traversed a portion of the same ground, spending a whole month in Merv. They reported the moving sand-hills, or 'Barchaus,' to be great obstacles to the construction of the Transcaspian railway. Their intention, when last heard from, was to search for a route to Balkh *via* the Amu-Daria. Thence they would attempt to reach Kafiristan over the Hindu Kush, hoping to find a pass free from snow, notwithstanding the lateness of the season. They have since been captured by the Afghans, and are now in close confinement.

There is a clear and valuable account of the recent troubles in Afghanistan, from a Russian point of view, in the *London Times* for Nov. 1 and 12. This purports to be a translation of a synopsis of a Russian 'blue-book.' It appeared originally in the *Journal de St. Petersbourg*.

The officers in charge of the Indian survey have already surveyed Burma from Mandalay southward along the Irawaddy as far as Pagan. It is probable that a rough sketch-map of upper Burma on a quarter-inch scale will be published before long.

Among recent school-maps we note 'The British empire on a uniform scale of 107 geographical miles to an inch,' by William Shaw (London, Philip & Son). Naturally the most extensive limits have been assigned to the British possessions; and this in some cases, as in Africa, to the great injury of other colonial powers. Alto-

gether, the map, though useful, reflects scant credit on its author.

A good statement of the present condition of the British colonies, from the side of the colonies themselves, is 'Her majesty's colonies: a series of original papers issued under the authority of the royal commission.' The introduction is by Seeley, whose 'Expansion of England' has introduced him to a host of readers.

Determined to be up with the times, the geographers of Australasia have formed a geographical society, which has flourished so luxuriantly that a branch society, restricted to South Australia, has already put forth its first volume of Proceedings.

THE TRAINING OF THE MEMORY.

SYSTEMS of mnemonics are exceedingly numerous, and the number of persons who have discovered "the quickest and best way to acquire a perfect memory" is legion. Every once in a while some new and absurd book on the training of the memory is foisted upon the public, and each has its dupes. The trouble with them all is the same, — ignorance of the physiological conditions of memory, and a very inaccurate acquaintance with psychology. Therefore we must plead guilty to the possession of a prejudice against any book on the education of the memory. It was with this prejudice that we took up Dr. Holbrook's little book;¹ but the perusal of the preface and the introductory sections alone proved that for once at least a prejudice against books on training the memory was unfounded. Dr. Holbrook writes with a physiological and psychological knowledge of his subject, and he treats it in a plain, straightforward, common-sense way. After showing the physiological basis of memory, he draws the practical conclusion that robust health, a well-nourished brain, and a healthy nervous system are the normal physiological conditions of a good memory. The psychological conditions are strict attention to sensory impressions, repetitions of them, and the formation of chains of association for them. The value of association may be tested by any one who is foolish enough to doubt it, by making the test given by Dr. Holbrook on p. 113, quoted from Dr. Pick's work on training the memory. We ourselves have tried it with several persons, and found it a most excellent and practical illustration. The practice of making notes of important matters is adverted to and commended, even if the notes are at once thrown away, because the process of writing the fact, name, or date down increases our attention to it,

¹ *How to strengthen the memory.* By M. L. HOLBROOK, M.D. New York, Holbrook, 1886. 12°.

and deepens the original sense-impression. Dr. Holbrook gives wholesome advice to persons of weak memories, and shows how such may be trained to become very retentive and accurate. A few judicious paragraphs are given on the art of forgetting, instruction in which is quite as necessary for that class of persons who insist on overloading their memories with all sorts of mental rubbish, as is instruction in remembering for those minds which seem to retain nothing.

LONDON LETTER.

AN interesting discovery has very recently been made in the direct line between Pompeii and Nocera. The digging of a well in a vineyard revealed the existence of a street of tombs, about one thousand feet east of the amphitheatre of Pompeii. If the whole street is as closely lined with tombs as is the portion laid bare, it will be one of the most important discoveries lately made in that part of the world; but unfortunately money is wanting, so that the excavation is going on very slowly. Most of the tombs are covered with rude inscriptions painted in red, many of them being of the nature of advertisements, the tombs thus serving the purpose of a newspaper along the much-frequented road. The exact date has not yet been accurately ascertained, but they probably belong to the periods of Julius Caesar and Tiberius. A contrast may be drawn between the condition of Pompeii and that of Pergamon, which, although double the size of Pompeii, has, thanks to the energy of the Prussian government, been laid clear within eight years. In the latter, beautiful, finely painted statues, votive offerings to Athena, and belonging to the sixth century B.C., have been found buried in the earth, and literally forming the foundation of the houses above. Their style of art is one hitherto not supposed possible at so remote a period, and they cause Pompeii to appear quite modern.

The discovery of an aqueduct which probably dates back to the time of King Solomon is reported from Jerusalem, and it is confidently anticipated that the further excavation of it will bring to light some extremely interesting and valuable inscriptions.

The following particulars with regard to the Severn tunnel, which shortens the distance between the South Wales coal-field and the south and west of England, and which was opened yesterday for passenger traffic, may be of interest. The first sod was turned in March, 1873. The length of the tunnel is 7,664 yards, or $4\frac{1}{2}$ miles, of which $2\frac{1}{4}$ miles are under the river-bed, with a minimum 'cover' of 45 feet, and a maximum of

100; all this portion being bored through hard sandstone, conglomerate, and red marl, and costing roughly £100 per yard. The works have been flooded by land-springs four times, and the total cost is about two millions sterling. The tunnel is lined throughout with vitrified brick, set in about three feet thickness of cement.

It is announced to-day that Professor Rücker, F.R.S., has been appointed by the lord president of the council to the professorship of physics in the Normal school of science, and Royal school of mines, South Kensington, London, made vacant by the death of Professor Guthrie, F.R.S. The friends of the latter will regret to learn that his widow and family are but ill provided for, in consequence of the numerous family claims upon him during his life, and it is probable that the Physical society of London will start a fund on their behalf. Professor Rücker was, until recently, professor of physics at the Yorkshire college, Leeds, after which he unsuccessfully contested a parliamentary election for that city.

The reading and discussion of Mr. Gisbert Kapp's paper on the 'Predetermination of dynamo characteristics' have occupied three evenings (one a special and extra meeting) at the Society of telegraph engineers and electricians. The paper dealt with the construction beforehand of what may be called the 'idle' characteristic curve of dynamos; and the discussion turned in great part upon the questions of magnetic resistance, and especially of air resistance, as well as on the analogy between the electric and magnetic circuits. Before commencing his paper, Mr. Kapp stated that only two days previously he had found that many of his points had been anticipated in a paper on dynamo-electric machinery, by Dr. J. and Dr. E. Hopkinson, communicated to the Royal society in May last, but which had only just been published. It is greatly to be regretted that the routine of the Royal society prevents an earlier publication of important scientific papers which have a direct bearing upon industrial progress.

One result of the more extended adoption of the electric light in public buildings in London is a notable increase in the number of winter exhibitions of pictures. Nearly all artistic societies of any importance now hold their 'winter exhibitions' with as great regularity as the summer ones, which open in May. The electric lighting of the Grosvenor gallery, due chiefly to Sir Coutts Lindsay, first demonstrated the advantages which were thus obtainable.

The disinfection of articles of clothing, and of dwellings, after infectious ailments, is admittedly one of the most important duties which attends the work of preventing disease. A recent report

of the medical officer of the local government board presents the entire question of the destruction of germ-life in a new aspect, including, as it does, a memoir on disinfection by heat, from the pen of Dr. Parsons. The degree of dry heat necessary to kill the germs of diseases well known to be infectious was first investigated. The bacilli of splenic-fever, for example, were killed by exposure for five minutes in a dry heat varying from 212° to 218° F. but their spores did not yield to two hours at 220°. One hour at 245°, and four hours at 220°, achieved the result. Some very remarkable practical instances are given of the difficulty with which dry heat penetrates such articles as bedding, blankets, and pillows. For example: a thermometer enveloped in a roll of flannel, placed in a hot-air bath at 212°, only registered 130° at the end of one hour! Dr. Parsons demonstrated by numerous experiments that steam at or above 212° possesses a very much greater power of penetration and disinfection than dry heat, and that, where actual steam cannot be employed, moistening the air of the heated chamber materially reduces the time required for efficient disinfection. Apparatus for thus treating the clothes, etc., of the sick poor ought to be a feature of the municipal arrangements of every city.

The sewage discussion (started by Dr. Meymolt Tidy's paper, alluded to in this correspondence in the summer) was continued, but not concluded, last night. Dr. Alfred Carpenter made a very strong speech in favor of irrigation, pointing out that the milk obtained from the sewage farm at Croydon was consumed with perfect safety. On the question of standards, a decided opinion was expressed, that these constant discussions of chemists would before long lead to a complicated formula, which would become a standard in a particular case.

A curious discussion, which attracts a good deal of attention, is now going on upon the use of boracic (or boric) acid for the curing of fish. It is being largely employed by the Norwegians; and the result is, that Scandinavian herrings are to some extent superseding the Scotch produce in the English market. Opinion is largely divided upon its toxic properties, in repeated small doses, and the whole matter is so new, that *experientia docet* will hardly avail. The first observation of the preservative power of alkaline borates is said to have been made in the case of a dead horse in southern California.

W.

London, Dec. 2.

HUBERT HERKOMER, Slade professor of art at Oxford university, proposes to paint before his classes as a means of instruction.

NOTES AND NEWS.

IN referring to the work of the appropriation committee recently on the floor of congress, Mr. Long from Massachusetts remarked that "it ought to be said in justice that the coast survey is in a condition of suspension, owing to the unaccountable, and, I think, culpable neglect of the President to appoint a man of scientific attainment at its head. The committee on appropriations have some reason for saying that they do not feel like giving full weight to the recommendation of a superintendent, unless that superintendent be a man of scientific acquirements. The gentleman who is at the head of it — an estimable man, who is doing the best he can, and is to be credited for what he has done — is not and does not pretend to be a man of any fitness or any training for the place. He would frankly say, I have no doubt, that he regards himself merely as a *locum tenens*, and is ready to give it up whenever the President will select the proper man. And yet for nearly two years the President of the United States, turning a deaf ear to the demands of science and commerce, refuses to fill this post, for which there is no lack of worthy material, and is making this coast survey the sport almost of public opinion."

— The recent death of Paul Bert, and the publication of a new edition (Philadelphia, *Lippincott*) of his 'First steps in scientific knowledge,' are amply sufficient reasons for calling further attention to that admirable little book. Its phenomenal sale in France, and the large sale of the English edition, apart from the intrinsic excellence of the book itself, warrant us in predicting the great success of the edition prepared for American schools by Prof. William H. Greene of Philadelphia. Though embracing the elementary facts of natural history, geology, physics, chemistry, anatomy, and physiology in some four hundred and fifty duodecimo pages, M. Bert's book is at once thorough, simple, and exact. It is a book which should find its way into every school in the country pretending to give a sound mental training; and the mastery of it, or its equivalent, should be required for admission to every high school and college in the land.

— Professor Heinrich von Treitschke of the University of Berlin has been appointed royal historiographer of Prussia, in succession to the late Leopold von Ranke.

— The steamer A. D. Bache, of the coast survey, will leave New York this week for the coast of Florida, where Assistant Hergesheimer is already at work. Assistant Perkins will commence work on the south coast of Florida about Jan. 1.

All the parties on the transcontinental geodetic work have now left the field on account of the winter season; all the parties on the Pacific coast also have been withdrawn from the field on account of the lateness of the season.

— The Saturday morning lectures given by Professor Boyesen and Dr. Butler at Columbia college last spring, proved so successful that arrangements are making for a number of similar lectures to be given during the winter and spring of 1887. The lectures will be open to the public, and tickets may be obtained free of charge by application to the registrar at Columbia college. Among the announcements definitely made are two lectures by Professor Munroe Smith on Bismarck, on March 12 and 19, and two on pedagogics by Dr. Nicholas Murray Butler on March 26 and April 2. It is also expected that Professors Boyesen and C. S. Smith, and Instructors Goodnow and Scribner will deliver lectures.

— Somebody has been figuring out the average salary paid to teachers in a selected list of leading cities in the United States, with the following results:—

San Francisco . . .	\$980.06	St. Louis	\$607.01
Boston	933.08	Albany	606.58
Cincinnati	728.25	Brooklyn	606.22
New York	707.90	Kansas City	606.13
Chicago	705.66	Detroit	605.19
Dayton	698.28	Indianapolis	601.79
Columbus	672.71	St. Paul	599.87
Washington	671.65	Providence	595.41
Springfield	641.64	Louisville	588.49
Newark	638.01	Buffalo	576.87
Milwaukee	631.94	Baltimore	570.82
New Haven	614.00	Nashville	517.51
Minneapolis	607.40	Philadelphia	

— We have received from Messrs. Macmillan a number of books in their Clarendon press series for schools. They are, as a matter of course, models of book-making, and it is a luxury to use them. Abbott's 'Greek reader' is novel, for it substitutes Aesop's 'Fables,' and stories from his life, for the traditional selections from the Anabasis. Miss Buchheim's new edition of Niebuhr's 'Griechische heroen-geschichten,' and Saintsbury's capital edition of Racine's 'Esther,' as well as his selections from Gautier, are doubly welcome, because they furnish material for placing elementary modern-language instruction on a higher plane. The meaningless sentences and the scraps of prose literature too often forced upon the young student of French and German, not only fail to give him a thorough and accurate knowledge of the grammar, — for which purpose they are presumably intended, — but they deaden his interest, and blunt his literary sense, at an age when both should be stimulated and encouraged. The use of some such books as these prepared by the Clarendon press is infinitely preferable. To Mr. Wickham's notes on selected odes

of Horace, published in the same series, we have but one observation to make, and perhaps that should be addressed to the publisher; that is, that notes of this class and extent are needed within the same covers as the text itself, and nothing is gained, but much lost, in convenience, by binding the notes separately. We believe, however, that the publishers do have an edition in which both odes and notes are bound together.

— Copenhagen has, according to the census of this year, 285,700 inhabitants, an increase of 1.6 per cent in the last twelve months.

— According to Professor Heim of Zurich, there are 1,155 glaciers in the Alps, of which 249 are more than 7,500 metres in length. The glaciers are distributed as follows: in Switzerland, 471; in Austria, 462; in France, 144; and in Italy, 78. The largest glacier is the Aletsch, which stretches over 24 kilometres. The total surface of the glaciers is estimated at 4,000 square kilometres, of which the glaciers in Switzerland alone furnish 1,840 square kilometres.

— There are 510 kilometres of railway in Greece.

— The first Siberian university has recently been opened at Tomsk.

— Khartum, which is in ruins through the fortunes of war, has yielded its precedence as the principal town of the eastern Soudan to Omdurman on the White Nile.

— The correspondents in Switzerland and France, of the London *Journal of education*, report the following news, which is of general interest. In Switzerland the minister of instruction has taken in hand a revision of the law on higher education of 1879, on the following grounds. The present code is not based on sound psychological principles, and ignores almost entirely the natural development of the mind. Some subjects, eminently fitted for the earlier years of the intellectual development of the pupils, are reserved for the higher classes only, while the lower classes are chiefly occupied with very indigestible matter. The teaching of classics, as at present carried out, has a most pernicious influence in the school. It is commenced too early, too much time is given to it, and it is not apportioned on rational grounds. Latin and Greek stand in the way of many subjects of equal value with regard to mental training, and of far greater significance in actual life. The pupils, as a rule, take little interest in their classical studies. But this is hardly to be wondered at, seeing that the study of literature is not begun until the fourth year in most *gymnasias*, more than three years and a half being spent on a purely grammatical course. The proposed reform

will chiefly consist in relegating the classics to the higher classes of the *pro-gymnasia* and to the *gymnasia*, and in giving a greater share of the timetable to modern languages. In France the study of modern languages, so long neglected, is being encouraged with great zeal, and at a considerable outlay of money. The minister of instruction, M. René Goblet, intends to send those students of the *Faculté des lettres* who have been recommended to him for industry and ability, to Germany and England after the first year of their university course. All their expenses are to be defrayed by the state. Their stay is to extend from July to December.

— Professor Alphonse Mongeol of the lycée at Aurillac writes in *L'université* as follows concerning the necessity for a knowledge of German: "The German language is spoken by more than eighty millions of persons in Germany itself, in Austria, Switzerland, Belgium, Holland, Russia, and America. On a recent journey from Constantinople to Paris by way of Buda-Pesth, Pressburg, Vienna, Linz, Salzburg, Augsburg, Ulm, Stuttgart, Carlsruhe, and Strasburg, I called the attention of my companions to the fact, that, although we stopped in a number of the finest cities of Europe, it was not until we reached Strasburg that the French language was of the slightest use to us. In all branches of science Germany stands at the top. I need not refer to the countless number of publications on scientific and literary subjects which appear annually in Germany, and which it were folly to think of translating into French. The rector of the school-district of Clermont lately told me that he would gladly exchange all that he knew of Greek and Latin for an equal knowledge of English and German. Who is there among our scholars, or how many can we count in our entire nation, who can deliver a scientific address in the German language as Dr. Koch lately spoke in French at Marseilles, and the archaeologist Schliemann at Constantinople?"

— Dr. Percival, president of Trinity college, Oxford, has been appointed head master of Rugby school, and has accepted the appointment. Dr. Percival is an LL.D. of the University of St. Andrews.

— At the recent election for a lord-rector of St. Andrews university, Mr. A. J. Balfour, M.P., secretary for Scotland, was chosen by a majority of twenty votes over Sir John Lubbock, M.P.

— Principal Sir William Muir of the University of Edinburgh has announced that arrangements have been completed for conferring a special schoolmaster's diploma, and that regulations have been adopted for the granting of the same. The

diploma shall be conferred only on graduates in arts of the University of Edinburgh, who have attended the education class of the university, and who have passed an examination in the theory, art, and history of education, to be conducted by the professor of education and an additional examiner. Each candidate must give evidence that he has attended a course of practical instruction in a training-college for teachers; or that he possesses the government qualification in the practice of teaching required of graduates, and provided in the Scottish code; or that he has taught publicly at least one year in a school, and holds a satisfactory certificate of practical skill from the head master of that school. As the first additional examiner of this scheme, the university court has appointed Mr. Maurice Paterson, B.A., rector of the Free church training-college, Moray House, Edinburgh. The subjects of examination in April, 1887, are, 'The class lectures of the professor of education;' Locke, 'On the conduct of the human understanding;' Milton, 'Tractate on education;' Comenius, 'Great didactic.'

— The Edinburgh association for the university education of women, founded in the winter of 1867-68, for the purpose of providing for women means of the higher education as nearly as possible equivalent to that provided for men in the Scottish universities, has opened, for the session 1886-87, classes in English literature, junior mathematics, senior Latin, and logic, conducted by university professors and assistants; and a class in physiology. Not only do students receive class certificates, signed by the professors and lecturers, but, by special regulations of the University of Edinburgh, students who have attended a certain number of the association classes, and have passed the local examinations of this or some other university, are admitted to examinations for further distinctions, in the form of ordinary and honor certificates in arts, granted by the university itself, and signed by the vice-chancellor. A sufficiently extensive course of study in the classes, thus stamped with the approval of the university, entitles to the full diploma of the association. At the end of last session, eight students gained ordinary, and four honor certificates, while two gained the full diploma of the association.

— At Oxford a new hall for women, called St. Hugh's, has been opened. It is intended for the benefit of members of the English church. The annual charge for board, residence, etc., is £45, and the tuition and lecture fees amount to £15 more.

— In the November issue of the *Revue internationale de l'enseignement*, M. Buisson concludes

his account of the colleges and universities of the United States. In this last article he describes Yale, University of Michigan, Johns Hopkins university, the American school for classical studies at Athens, and colleges for the higher education of women.

— The new vice-chancellor of Cambridge university is Dr. Taylor, master of St. John's college.

— The various state teachers' associations take advantage of the Christmas vacation to hold their annual or semi-annual meetings. Among others, the New Jersey teachers are to meet at Trenton; the Iowa teachers, at Des Moines; the Michigan teachers, at Lansing; the Associated academic principals of New York state, at Syracuse.

— M. Goblet, the minister of public instruction in M. de Freycinet's cabinet, has become premier of France. The new minister of public instruction is M. Berthelot, who has been for some time an inspector of secondary schools.

— Dr. W. W. Ireland, the well-known alienist, publishes in the *Journal of mental science* (October, 1886) an admirable account of the insanity of King Louis II. of Bavaria. The influences of hereditary neuroses, the gratification of what were at first slight eccentricities, and the gradual evolution of the most serious symptoms of hopeless insanity, make this case almost a type of the influences most favorable to mental instability. The king was not only insane, but typically insane.

LETTERS TO THE EDITOR.

*.*Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

Pleuro-pneumonia.

IN your issue of Nov. 26 you speak of the prevalence of pleuro-pneumonia in the counties of Harvard, Clinton, Newton, Jasper, and Benton.

1°. There is no Harvard county: presumably you mean *Howard*.

2°. Dr. Salmon and the officers of the state board of health declare the disease to be 'black leg,' and up to date about 400 head have died in this state. Dr. Salmon announces there is now no pleuro-pneumonia in the western states except at and near Chicago, Ill.

AMOS W. BUTLER.

Brookville, Ind., Nov. 29.

[The reports that contagious pleuro-pneumonia existed in Indiana are denied, and it is now stated that what was reported to be that disease is pronounced by Dr. Salmon and the officers of the state board of health to be 'black leg,' from which 400 head of cattle are said to have died. It is also stated that Dr. Salmon of the U. S. bureau of animal industry has announced that there is no contagious pleuro-pneumonia in the western states except at and near Chicago, Ill.]

On this subject we quote from a letter just received

from Dr. D. E. Salmon, chief of the bureau of animal industry: "In reference to the districts in which contagious pleuro-pneumonia exists in the United States, would say, that beginning with Long Island, New York, and Westchester counties, in the state of New York, we have found it to exist in various parts of New Jersey and the south-eastern part of Pennsylvania. The points of infection are continually changing in these states, and it is a very difficult thing to make a definite statement by counties. In Maryland there is a good deal of the disease in Baltimore and vicinity, but the remainder of the state appears to be nearly free. The District of Columbia has been infected for a long time, but I do not know of any herds here in which the disease exists now. Probably a vigorous inspection would discover some. In Virginia I do not know of any infected district except Norfolk. This is all there is east of the Alleghanies. In the Mississippi valley states there is but one outbreak at present, and that is in Cook county, Ill. The disease which I investigated in Indiana was 'verminous bronchitis,' or lung worms." — Ed.]

Liberty's torch.

The noble statue of Bartholdi in New York harbor suffers a great injustice, so far as the idea of its conception goes, and the requisites for its most complete artistic presentation is concerned, in being made to hold a star in its hand instead of a wavering pile of flame. The blue orb of intense light shining from the uplifted hand poorly represents the lambent and rolling stalks of fire which the thought of a torch suggests, and fails to accentuate the statue with any dramatic or spectacular force.

The attempt should be made to burn a large volume of gas properly distributed over the present surface of the torch, and this would seem altogether feasible. A consumption of from a thousand to two thousand cubic feet of gas per hour might be required, but the result would be incomparably more striking and noteworthy. A series of one-inch pipes passing up into the torch, emerging at various points so as to completely invest it with the confluent flames issuing from their openings, would probably serve the purpose, the gas being permitted to burn under a pressure but slightly in excess of its own ascensional power. Two objections might be urged against this proposition, — first, the smokiness of the flame, producing an ugly and dirty appearance; second, the probability of its extinction in high gales. The first objection has not really much weight, as the tail of drifting smoke would hardly detract from the splendor of the pillar of flame, and in any case could be considerably overcome by an efferent tube with a perforated circular cap feeding air to the summit of the torch, somewhat on the plan of the central air-channel in the popular climax oil-lamp. The second objection is valid, but only in extreme cases; and, as the gas should be lit by electricity, the highest gales would only alter the constancy of the light, its extinction being succeeded by the renewed flame. Again by curving the extremities of the pipe, even these exceptional cases might be yet further reduced in number. The gas might be supplied from the mainland, or if that appears too expensive, or itself impracticable, naphtha or gasoline gas (enriched air) could be safely used, the precaution being taken of substituting for the large tubes bundles of smaller pipes.

The penetrative power of such a flame, and hence its beneficial uses in the foggy weather of our latitude, combined with its *photometric massiveness*, would compare, it would seem, very favorably with the incandescent point of light which now at night marks the watch-tower of Liberty on Bedloe's Island, and in fogs dimly shines through the mist in an apologetic and feeble way quite disappointing.

L. P. GRATACAP.

New York, Dec. 15.

The relations of our colleges and preparatory schools.

In *Science* for Nov. 26 you comment editorially on the teachers' convention at Philadelphia, and close with the sentence, "It would be especially notable should it prove to be the first step in bringing our colleges and preparatory schools into frequent and close conference in some official manner."

Allow me to call your attention to the fact that in Michigan there now exists, and has existed since the year 1870, a relation between the university and the public high schools of the state, under which the graduates of schools, whose courses of study have received, after personal inspection by a committee sent for that purpose, the approval of the university faculty, are admitted to the university on the presentation of their high-school diplomas. The inspection of the schools is repeated at intervals, whenever it seems desirable to do so.

The privilege of admission on diploma, which was at first restricted to the public high schools of Michigan, has been gradually extended, and at the present time the University of Michigan holds this close official relation with thirty schools, public and private, in Michigan, and also with schools in New York, Illinois, Minnesota, and California.

WM. H. PETTEE.

[We were, of course, aware that in Michigan there is a system of co-ordination of university and high schools and academies, and we are now gratified to learn that this co-ordination embraces schools outside of the state of Michigan. It is to be regretted that this system is not adopted generally by our universities and colleges, and we renew our expression of hope that the late Philadelphia conference may emphasize the value of the Michigan system, and lead to its general adoption.—Ed.]

The Americanists.

There is a ludicrous slip of the pen in the account given in the last number of *Science*, of the Proceedings of the sixth congress of Americanists, held at Turin in September last. Supreme wisdom does not always seem to preside over the councils of this learned body; but it is hardly fair to Professor Grossi to represent him as having read a paper on the 'coins' of the old and new worlds before a society devoted to the study of prehistoric questions. What he had to say was about *monies*, and not *monnaies*, in the two continents, and was a sensible and learned discussion of the question. The same gentleman also presented a paper upon pyramids in the old and new worlds, and one upon the folk-lore of the primitive tribes of America.

HENRY W. HAYNES.

Boston, Dec. 13.

A new bat from Puget Sound.

Among the specimens collected in 1880 by Prof. D. S. Jordan, in the vicinity of Puget Sound, for the national museum, is a small bat, which, upon examination, proves to be different from any hitherto described. It resembles the common blunt-nosed bat, *V. lucifugus*, but differs from it in several important characters. Most noticeable of these is the great length of the tibia; and I have therefore thought it appropriate to name this species *Vespertilio longicus*. It is the third species added to the fauna of the United States during the year. I subjoin a brief diagnosis.

Vespertilio longicus: fur uniform, umber color above; the same below, but with the upper fourth dull Naples yellow; interfemoral membrane clothed above and below to a line joining the centre of the tibiae; ears shorter than the head; inner margin of the couch convex, that of the tragus concave; calcaneum reaching only to middle of hind margin of interfemoral membrane; teeth as in *V. lucifugus*, but first premolar not imbricate with canine; brain-case very high; length of head and body 47.5 mm., head 16; height of ear, 12.5, tragus 6.5, fore-arm 39, thumb 6, tibia 20, foot 7.5.

F. W. TRUE.

U.S. nat. mus., Dec. 17.

Preliminary description of a new pocket gopher from California.

Mr. F. Stephens, one of my Californian mammal-collectors, has sent me several specimens of a small pocket gopher, of the genus *Thomomys* (*Thomomys talpoides perpallidus*, sub-sp. nov.), which I do not find described. The sub-specific name '*perpallidus*' refers to the very pale color of the animal. It may be distinguished at a glance from all its congeners, except *T. clusius* of Coles, by its color, which is very pale brownish-yellow above, and white underneath and on the sides and legs. It differs from *T. clusius* in the great length of its tail, which is half as long as the head and body, and in other characters which will be pointed out in a later paper on the animal. All the specimens were captured on the arid Colorado desert, in southern California, in March and April, 1886.

C. HART MERRIAM.

Contents of foreign educational periodicals.

Zeitschrift für schul-geographie, October. — Bemerkungen zum geographischen unterricht an den gymnasien nach den neuen instructionen, Dr. Karl Lechner. — Ueber das verhältniss des land- und wasserareales auf der erdoberfläche. — Notizen, literatur, u.s.w.

Zeitschrift für schul-geographie, November. — Einige bemerkungen über den zustand der geographie in Dänemark als schulfach, Prof. Dr. Löffler. — Die verbesserung des julianischen kalenders, Dr. Pein-Belgrad und seine umgebung, Prof. G. Jauss. — Die prairie, ein geographisches charakterbild. — Notizen, literatur, u.s.w.

Zeitschrift für das realschulwesen, November. — Die pluralisation der substantivischen wortcomplexe im Französischen, Felix Zverina. — Der planimetrische und constructive unterricht in der unterrealschule, Joseph Bayala. — Schulnachrichten, notizen, anzeigen, u.s.w.

Bulletin mensuel de la ligue française de l'enseignement, November. — Les sociétés d'éducation civique et militaire, Jean Macé. — Cantines scolaires de Toulouse, Eugene Dubief. — Faits divers.

Canada educational monthly. — Annual convention of Queen's university. — A plea for our reading-circles. — The relation of higher education to religion, President William DeWitt Hyde. — Lord Derby on juvenile education. — Children past and present. — Preserve the voice of the child. — Notes, correspondence, etc.

Pädagogisches archiv. — Die ersten sätze der stereo-
tomie, Dr. C. Lackemann. — Die verdeutschungs-
bestrebungen der gegenwart, Regierungs-rath Sar-
razin. — Unterrichtsminister Trefort über die schul-
reform. — Sprachsaal, anzeigen, nachrichten, u. s. w.

Educational times, December. — Folk-tales. — Meeting of the Council of the college of preceptors. — University and college intelligence. — Educational notes and summary. — The retirement of Mr. Matthew Arnold. — Education in India. — Dr. Percival's election to the mastership of Rugby. — The Bishop of London at the City of London college. — Reviews, notices, etc.

Journal of education, December. — Occasional notes. — Practice versus theory, E. R. Wethey. — The training of elementary school teachers. — A fair field and no favor. — English literature and the classics. — Reviews. — Sonnenschein's cyclopaedia of education. — Sunday at school, Rev. J. Robertson; A lay brother's reply. — Correspondence. — History-teaching, a lesson from America. — Notices, etc. — The training of the faculties of judgment and reasoning, H. Courthope Bowen. — Education in Australia. — The teachers' guild of Great Britain and Ireland.

Revue internationale de l'enseignement, Nov. 15. — Ouverture des conférences à la faculté des lettres de Paris; Allocution de MM. Lavis et Petit de Juleville. — Le Droit et le Latin, M. J. E. Labbé. — Universités et collèges d'enseignement supérieure aux Etats-Unis, M. E. Buisson. — La nouvelle loi sur l'organisation de l'enseignement primaire, M. Carré. — Chronique, nouvelles, bibliographie.

Educational articles in miscellaneous periodicals.

Alcoolismo, sue conseguenze morali e sue cause. E. Morselli. *Rivista di filosofia scientifica*, October.

[A review of N. Colajanni's book of the same title.]

Anatomistes anciennes, les. M. A. Laboulbène. *Revue scientifique*, Nov. 20.

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Bibliographie u. quellen-kunde der österreichischen literaturgeschichte. J. Minor. *Zeitschrift f. d. österreichischen gymnasten*, Oct. 14.

Breymann de l'étude des langues modernes. Anonymous. *Revue critique*, Nov. 1.

[“L'étude de M. Breymann se divise en deux parties : dans la première, il recherche le but que poursuit l'enseignement des langues dans les universités allemandes ; dans la seconde, il examine les moyens d'arriver à ce but”]

British school at Athens. Unsigned. *Macmillan's magazine*, December.

Dean Plumtre's 'Dante.' Bishop of Ripon. *Contemporary review*, December.

Educational methods. George Sand. *North American review*, December.

English literature at the universities. Unsigned. *Macmillan's magazine*, December.

Enseignement de la philosophie dans l'université de France, P. M. Emile Beaussire. *Revue des deux mondes*, Nov. 1.

Enseignement des sciences ; les femmes-médecins en Angleterre. Unsigned. *Revue scientifique*, Nov. 27.

Genève et la nouvelle loi scolaire. Ernest Stoecklin. *La nouvelle revue*, Nov. 1.

Goethe and philosophy. Prof. Edward Caird. *Contemporary review*, December.

Hellinisme dans les écrivains du moyen âge du VII^e au XII^e siècle, P. A. Delboulle. *Revue critique*, Nov. 1.

[A review of Abbé Tongard's book of the same title.]

How I was educated. Pres. E. G. Robinson. *Forum*, December.

Hypnotisme et responsabilité. Mm. Binet et Féré. *Revue scientifique*, Nov. 13.

[An extract from the forthcoming work by these authors on animal magnetism]

Influence des femmes dans la littérature française, P. F. Brunetière. *Revue des deux mondes*, Nov. 1.

Intellectual mission of the Saracens, the. Edward Hungerford. *Atlantic monthly*, December.

Life at the Scotch universities. J. Leys. *National review*, December.

Loi sur l'organisation de l'enseignement primaire. *Journal des économistes*, November.

[The full official text of the new French law regulating primary instruction.]

Master of Trinity, the late. Unsigned. *Temple Bar magazine*, December.

Miller manual labor school of Albemarle, Va., the. *Scientific American*, Dec. 11.

Modern philosophy : realism vs. idealism. R. S. Moffatt. *National review*, December.

Mouvements réfléchis de l'enfants, les. *Revue scientifique*, Nov. 20.

[A chapter from the forthcoming French translation of Preyer's 'Die seele des kindes']

Mysticisme au XII^e siècle. M. Ch. Levêque. *Revue politique et littéraire*, Nov. 13.

Notes on Americanisms. R. A. Proctor. *Knowledge*, December.

Object of a university, the. Elisha Mulford. *Atlantic monthly*, December.

Open spaces and physical education. Lord Brabazon. *National review*, December.

Professeurs de littérature dans l'ancienne Rome et leur enseignement depuis l'origine jusqu'à la mort d'Auguste. Charles Cucuel. *Revue critique*, Nov. 1.

[A review of M. E. Juillen's book of the same title. “L'école, l'élève, la famille, le pédagogue, le professeur, l'enseignement (auteurs, grammaire, littérature), les devoirs, les études accessoires, M. Juillen examine successivement chacun de ces points avec une netteté jointe à une abondance de détails dont on ne pouvait trop se féliciter.”]

Science and morals. Prof. T. H. Huxley. *Fortnightly review*, December.

Techner's und Sweet's vorschläge zur reform des

- unterrichts im englischen. H. Klinghardt. *Englische studien*, Sept. 15.
- Thought-reader's experiences, a. Stuart C. Cumberland. *Nineteenth century*, December.
- Uniforme des élèves de l'école normale, P. M. Dionys Ordinaire. *Revue politique et littéraire*, Nov. 6.
- Wiese's (L.) Lebenerinnerungen u. amts-erfahrungen. Friedrich Paulsen. *Berliner philologische wochenschrift*, Sept. 11, 1886.
- [An excellent account by Professor Paulsen of Dr. Wiese's educational work and influence.]
- Zwang-erziehung verwaorloster kinder in Hessen. Dr. Ludwig Fuld. *Jahrbücher f. national-ökonomie u. statistik*, Oct. 23.

Calendar of Societies.

Chemical society, Washington.

Dec. 9. — H. W. Wiley, Our sugar-supply.

Anthropological society, Washington.

Dec. 7. — H. C. Yarrow, Navajo treatment of ague; H. Ten Kate, Travels in Guiana and Venezuela; Cyrus Thomas, Mound-exploration work of the bureau of ethnology.

Biological society, Washington.

Dec. 11. — Theobald Smith, Parasitic bacteria and their relation to saprophytes; F. A. Lucas, On the osteology of the spotted Tinamou (*Nothura maculosa*); C. D. Walcott, Tracks found on strata of upper Cambrian (Potsdam) age; Frank Baker, The foramen of Magendie; C. Hart Merriam, Contributions to North American mammalogy of a new sub-species of pocket gopher.

Philosophical society, Washington.

Dec. 18, *election of officers for 1887*. — President, William Harkness; vice-presidents, C. E. Dutton, Garrick Mallory, J. R. Eastman, G. K. Gilbert; treasurer, Robert Fletcher; secretaries, Marcus Baker, J. H. Kidder; members at large of the general committee, H. H. Bates, F. W. Clarke, W. H. Dall, E. B. Elliott, G. B. Goode, H. M. Paul, C. V. Riley, W. C. Winlock, R. S. Woodward.

Engineers' club, Philadelphia.

Dec. 4. — Carl Hering, Analogies between electrical and mechanical units and phenomena; A. H. Howland, On the general subject of water-pipes; Rudolph Hering, Notes upon the present investigation of the drainage and water-supply of Chicago.

Academy of natural sciences, Philadelphia.

Nov. 30. — Miss Helen C. De S. Abbott, Haematoxylin; Professor Ryder, The transmission of morphological changes; G. A. Koenig, Boiler incrustation; On schorlemite as a variety of melanite.

Torrey botanical club, New York.

Dec. 14. — Julius Bisky, Additions to the flora of Queens county, N.Y.; Arthur Hollick, Revision of the species *Cerastium arvense*, L., and its varieties.

Institute of social science, New York.

Dec. 22. — Simon Sterne, Free trade.

Jan. 13. — A paper is expected on The economic heresies of Mr. Henry George.

Natural science association, Staten Island.

Dec. 11. — Mr. Henshaw, Azolla Caroliniana, Willd; W. T. Davis, Fasciated stems and branches from *Rhus glabra* and *Ailanthus glandulosus*; Mr. Hollick, Glaciation on the island.

Connecticut academy of arts and sciences.

Dec. 15. — J. H. Emerton, New England spiders of the family Ciniflonidae; J. T. Fewkes, Is the vast mass of oceanic water, between the surface and bottom, barren of life, or occupied by a peculiar fauna?

Society of arts, Boston.

Dec. 9. — Elihu Thomson, New art of electric welding.

Society of natural history, Boston.

Dec. 15. — Edward G. Gardiner, Recent researches on a third (rudimentary) eye in lizards; W. M. Davis, The mechanical origin of the triassic monoclin in the Connecticut valley.

Brookville society of natural history, Brookville, Ind.

Dec. 7. — A. W. Butler, Some notes on the habits of turtles; C. F. Goodwin, Observations on the sense of vision in domestic animals; Joseph Lindsay, The manufacture of paper.

Publications received at Editor's Office, Dec. 6-18.

- Agricultural science, proceedings of the society for the promotion of, 1886. Columbus, O., *Gazette pr. house*, 1886. 88 p. 8°.
- Brown, G. Report on experiments in trap siphonage at the Museum of hygiene, U. S. navy department, Washington, D.C. Washington, *Judd & Detweiler, pr.*, 1886. 14 p., 2 pl. 8°.
- Canada, annual report of geological and natural history survey of, 1885. Vol. i. Montreal *Dawson*, 1886. 791+24 p., maps, illustr. 8°.
- Dagincourt, Dr. Annuaire géologique universel et guide du géologue. Paris, *Comptoir géologique de Paris*, 1886. 28+362+79 p., 1 pl. 12°.
- Diller, J. S. Notes on the geology of northern California. (U.S. geol. surv., bull. 33.) Washington, *Government*, 1886. 23 p., illustr. 8°.
- Gordon, J. C. Practical hints to parents concerning the preliminary home-training of young deaf children. Washington, *Gibson Bros., pr.*, 1886. 45 p., illustr. 8°.
- Gurney, E., Myers, F. W. H., and Podmore, F. Phantasms of the living. Vols. i. and ii. London, *Trübner*, 1886. 84+573, 28+733 p., illustr. 8°. (New York, Stechert.)
- Heilprin, A. Explorations of the west coast of Florida and in the Okeechobee wilderness. Philadelphia, *Wagner free inst.*, 1886. [63] p. 4°.
- Hunt, T. S. Mineral physiology and physiography. Boston, *Cassino*, 1886. 18+710 p. 8°.
- Linnean society of New South Wales, catalogue of the library of the. Sydney, *Cunninghame & Co.*, 1886. 74 p. 12°.
- Low, J. G. and J. F. Plastic sketches. Boston, *Lee & Shepard*, 1887. 12 p., 47 pl. 1°.
- McCalley, H. On the Warrior coal field. (Geol. surv. Ala.) Montgomery, *State*, 1886. 16+51 p. 8°.
- Ranke, J. Allgemeine naturkunde. Lief. 60, heft 1. Leipzig, *Bibliographische institut*, 1886. 48 p., 1 col. pl., illustr. 4°. (New York, Westermann.)
- Ratzel, F. Allgemeine naturkunde. Lief. 51-59, hefte 9-17. Leipzig, *Bibliographische institut*, 1886. [431]+10 p., 9 col. pl., illustr. 4°. (New York, Westermann.)
- Sanitary convention held at Ypsilanti, June 30 and July 1, 1885, proceedings of the. Lansing, *State*, 1886. 173 p., illustr. 8°.
- Sudder, S. H. The cockroach of the past. London, *Reeve & Co.*, 1886. [16] p., illustr. 12°.
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- U. S. navy, annual report of the secretary of, for 1886. Washington, *Government*, 1886. 28 p. 8°.
- Wyoming, historical and geological society, proceedings and collections of the. Vol. iii. Wilkesbarre, Penn., *Wyoming hist. geol. soc.*, 1886. 128 p., portr. 8°.

SCIENCE.—SUPPLEMENT.

FRIDAY, DECEMBER 24, 1886.

THE BASIS OF A GRADED SYSTEM OF SCHOOLS.

HERBERT SPENCER, in his treatise on education, says, "To prepare us for complete living is the function which education has to discharge, and the only rational mode of judging of an educational course is to judge in what degree it discharges such function." Froebel's doctrine, that "education is the complete unfolding of the whole being of man," indicates how we are to be prepared for complete living, since complete living can only be realized by one perfectly developed in all his powers. The value of an educational course, then, is to be measured by the degree in which it develops all the powers of the man. And thus Joseph Payne sums up his consideration of the purpose of education by defining it as "the cultivation of all the native powers of the child by exercising them in accordance with the laws of his being, with a view to development and growth."

Since the possibility of complete living necessitates the cultivation of all the native powers of the child, it is plain that a system of schools should be so constituted that all the appliances used and all the studies prescribed shall tend towards the development of power. The unfolding of the whole being necessarily comprehends the cultivation of the bodily, mental, and moral powers. A system that does less than this fails to discharge its highest function in preparing for complete living. It is not an impertinent question to ask educators whether our present educational system comes up to the requirements stated in the opening paragraph. A system may fail to realize its highest function, not by reason of its own defects, but because of unfavorable conditions. The buildings and appliances may be inadequate or defective; teachers may be hampered by boards whose transactions are controlled by selfish or political interests; or public sentiment may stand very much in the way of progress. Nevertheless it remains the educator's duty to plan his system with a view to the highest attainment, and to gather all possible forces under his control.

It is my wish to indicate how the public-school system should, and to some extent does, discharge its function. The usual school course covers the period between five and eighteen years of age.

According to Currie,¹ school life is divided into three periods: viz., infancy, during the first six years; childhood, the next six or seven years; and youth, from that time to the eighteenth year. These periods are suggested, he says, "by so many distinct phases in the child's physical and rational being." During the first two periods, "animal enjoyment is the chief condition of life." "The period of youth unfolds itself when the mind begins to feel interest in its own exertions and to be somewhat self-sustaining in its operations." Subsequent to this, education takes on a professional or technical character, and is beyond the domain of the public school. By our laws it is the duty of the state to take in hand the education of infants, if we adopt the classification of children as suggested above. This law has been established not only by public sentiment and for public economy, but it is most necessary and right as viewed from an educational stand-point, though denied by some authorities. Children of the first two periods, from five to thirteen or fourteen, are enrolled in our elementary schools. Our youth are to be found in the high school: subsequent to that comes the normal and technical schools.

The function of a school system being to unfold all the powers of the child, the educator's first duty is to ascertain what are the powers of children in the various stages of their development; next, what are the means and materials appropriate to the proper exercise of those powers, and what mode or method should be used to apply those means and cause the activity of the child's powers.

The powers of children between the ages of five and thirteen, that should be operated upon by a system of education, are chiefly physical, and only the simple faculties of the mind are brought into requisition. For instance: the child's love of play and other manifestations of activity are his ruling passions, and the faculties used are those which depend mainly upon the activity of the senses. In the springtime of life the body and mind are undergoing the process of growth and formation, the body building up physical power, and the mind absorbing material for future use. The appropriate training for these years is that which stimulates natural physical growth of the body and all its parts, a wholesome use of all the senses, and a systematic exercise of the faculties

¹ Early and infant school education, p. 1, by James Currie.

of observation, imagination, and memory. By such a course the skilful teacher directs the will of the child, and cultivates all his moral characteristics.

The kindergarten is the only system which furnishes the means and the methods, and is systematically arranged to provide such a training as is suitable to children when they first enter the public schools; and the public-school system can never be complete until the kindergarten, the genuine Froebel system, is made the first step in the course. The natural exercise of the body is provided for in the games, the little hands and fingers are made skilful by the occupations, the senses are made acute by gifts, and all the faculties of the childish mind are set into activity; while at the same time a knowledge of number, form, color, symmetry, and language, is being naturally acquired.

During the later years of the elementary school, a similar course should be maintained, that would furnish all the facilities for the proper development of the physical, mental, and moral powers in their due proportion. The kindergarten work, and especially the true kindergarten spirit, should be made a part of the primary-school course. Drawing, paper-cutting, modelling, carving, sewing, etc., should occupy a fair portion of the time. It has been found that five hours of a day are too much for the intellectual labor of a child: the afternoon of school-work is of very small importance in the primary school, unless devoted to light occupations. The ordinary studies of the elementary school may be used to develop power, provided they are used according to the true principles of education. Reading, spelling, penmanship, and language are taught as one, by methods that cultivate the observation, the conceptive faculty, and the imagination. The early lessons in number, form, and drawing, tend towards the same end. Following these subjects comes geography, not to train the memory, but to further cultivate the observation and the imagination primarily. The outgrowth of this boundless study brings the child to a knowledge of other elementary sciences and of history, by all of which the faculties of the mind become exercised in the "complete unfolding of all the powers of the man."

The mistake made by the majority of teachers is in the method of presenting the subjects for study, and the methods are at fault because the purpose of study is lost sight of. The school curriculum is taught for the knowledge to be imparted instead of the power to be developed. The teacher is not alone to blame for this state of things: the examiner deserves the greater blame.

He asks how much the child knows: consequently the teacher devotes her time to imparting knowledge, by oral teaching, by explaining all difficult examples, and, in short, by doing most of the pupil's work. Why? "Because it takes too much time to wait for the children to do for themselves," and because the pupils are not able to do for themselves, and need the teacher's help, and thus, as Spencer says, "Having by our methods induced helplessness, we make helplessness the reason for our methods." On the other hand, the teacher who teaches for the sake of the pupil and not for the sake of the subject, who employs methods that tend to develop mental power, creates self-activity, and furnishes her pupil with the means by which he can make himself his own teacher.

The elementary schools having served the purpose for which they were established, it becomes the province of the high school to make use of those powers of the mind, and acquirements in the further training of the intellectual faculties, in which, as Currie says, the mind 'begins to feel interest.' The work of the high school is designed for the cultivation of the higher faculties of the mind. The ideas already acquired are to be elaborated by generalization, judgment, and reasoning.

The unity of such a system lies in its purpose; namely, the development of power at each stage of the child's growth. Each grade or step furnishes the proper material and the proper studies for the exercise of his powers. There is an order of studies; but the order does not depend merely upon the relations of the subjects to each other, but upon their fitness for the work of development. The arrangement of studies from this standpoint differs much from old courses of study. For instance: penmanship is now taught from the beginning because it belongs with reading; lessons on hygiene and physiology begin as soon as the child is able to observe the parts of his body, and to understand their uses and need of care; and so other elementary sciences are used to cultivate the observation of our little children. History is also taught in the primary schools to cultivate the imagination, and to awaken a love for our country and its heroes. At the same time the primary arithmetics have been purged of much of the old-time puzzles and conundrums, while the rules of technical grammar have been deferred till a later day.

The normal school educates those who have an aptitude for teaching, a love for children, and a desire to learn to train young minds. Its methods tend to strengthen the judgment and administrative powers, and the ability to put to

practical use the knowledge acquired, and are based upon the same principles of education that govern the methods of the earlier schools.

Such a system is consistent in all its methods and aims; it maintains a constant unity of purpose; while each department is distinct in its own individuality, and bears a proper relation to the whole.

C. E. MELENEY.

MR. MATTHEW ARNOLD'S REPORT ON ELEMENTARY EDUCATION ON THE CON- TINENT.

MR. MATTHEW ARNOLD has but lately resigned the office of her majesty's inspector of schools, a position which he has filled for many years with credit to himself, and with great benefit, we are sure, not only to such schools as have come under his immediate supervision, but also to English educational interests in general. One of his last official duties of any importance was to visit Germany, Switzerland, and France, and to write an official report on certain specified points connected with elementary education in those countries. Some portions of that report were used by Mr. Arnold in his address before the University of Pennsylvania, which was printed afterwards in the *Century* magazine. But the entire report is of the liveliest interest to American educators; for several of the points investigated by Mr. Arnold are those to which no little attention is being paid in this country, and all the information gathered by him is part of the material to be used by the comparative method in studying educational institutions and methods.

By the terms of Mr. Arnold's instructions, his attention was to be more particularly directed to Germany and Switzerland, and the points he was to study were four in number: 1°. Free education; 2°. Quality of education; 3°. Status, training, and pensioning of teachers; 4°. Compulsory attendance, and release from school. Only fourteen weeks were given to the inquiry; and of these, five were spent in Prussia, two in Saxony, two in Bavaria, two in Switzerland, and three in France. Mr. Arnold's latest mission, as he expressly states, differed from those of 1859 and 1865 in that he did not go now to study systems of education, but only to report on the four above-mentioned points. These points Mr. Arnold takes up in order.

Under the head of free education, he was instructed to ascertain whether gratuitous education is confined to elementary schools, or extends to other schools or colleges; what reasons induced the state to establish the gratuitous system; in what way (directly or indirectly) the lower classes

of society are made to feel the weight of the expenditure on education; in what way the dirty and neglected children in large towns are dealt with, and especially whether all descriptions of children are mixed in the same schoolroom; whether there is a legal prohibition against charging fees in public schools, even if parents and children are willing to pay; whether the attendance of children has increased or diminished since the establishment of free schools, Mr. Arnold answers these questions first with the information gained by him in Prussia. In the Prussian constitution of 1850 is this provision: *In der öffentlichen volksschule wird der unterricht unentgeltlich ertheilt*. But this provision has generally remained inoperative, because the popular school is to be maintained by the *Gemeinde*, or commune, and the communers have not in general found themselves able to forego the income from school fees. And, on the other hand, the state has not been able or willing to provide gratuitous instruction in the communes. Some few communes, however, have been able to throw their popular schools open to all classes of the population, free of all charge. Düsseldorf has done so: so has Berlin. The Berlin schools have been free since 1870, and last year it cost more than 6,000,000 marks to support them. At the time of the introduction of free schooling, the municipality had 49 communal schools, with 31,752 scholars; in 1885 it had 146 such schools, with 132,889 scholars. These communal schools are the only body of schools in Berlin or throughout Prussia in which school fees are not paid. Herr von Gossler, minister of education, was found by Mr. Arnold to favor making the communal schools free everywhere, and Prince Bismarck is said to agree with him. But among the public generally, including the teachers themselves and the government officials, the weight of opinion is against such a course. Even where school fees are charged, they meet but a small portion of the total expense. On an average for the whole of Prussia, school fees furnish 20.58 per cent of the cost of teaching in the popular schools; endowments, 12.02 per cent; the communes, 55.26 per cent; and the state, 12.14 per cent. In some towns, Cologne for example, where the popular schools are not free, provision has been made for giving free instruction to poor children in schools by themselves. But in Berlin the children of the working and middle classes all attend school together. The only distinction made on the ground of poverty at Berlin is that school-books and school-material are supplied gratuitously whenever the teacher finds that the child cannot afford to buy them.

But throughout Germany, payment is the rule, free schooling the exception. The popular school is a municipal thing, and is paid for out of municipal taxes. No special school tax is levied.

In Switzerland there is also a constitutional provision determining free schooling. Article 27 of the Federal constitution of May 29, 1874, says, "Primary instruction is obligatory, and in the public schools gratuitous." So jealous are the cantons of their local independence, that there is no national department of education. Yet each canton has complied with the above article of the constitution. Mr. Arnold takes as examples canton Zurich, which is Protestant and industrial, and canton Lucerne, which is a mountain canton and Catholic. In Lucerne the child must come to school at seven years old, and may come at six: his day-school course lasts until he is fourteen; and he has then, unless he goes to some higher school, to attend a *fortbildungsschule* for two years more. In Zurich the child must come to school at six years old: his day-school course lasts until he is twelve; and he must then spend three years at an *ergänzungsschule*, besides an hour a week at a singing-school. All these schools are free, and in canton Lucerne the higher schools are free also. Religious instruction is given in the popular schools in the several cantons according to the faith of the majority. Catholic instruction is given in Lucerne, Protestant in Zurich. There is, according to Mr. Arnold, no unfair dealing, no proselytizing, no complaint. In Switzerland there is no separate provision for dirty and neglected children, because there is no such class. Fifteen years ago there were 1,500 pupils attending the great town-school of Lucerne: now there are 3,300. "I regard free schooling, however," says Mr. Arnold, "rather as a part and sign of the movement of advance in popular education than as itself the cause of the movement."

In France, Mr. Arnold found that the payment of fees in public primary schools was abolished in 1881, and that attendance at school is obligatory for children of both sexes between the ages of six and thirteen. This is ascribed to no constitutional provision, as in Germany and Switzerland, but to *l'idée démocratique*, a moving cause at which Mr. Arnold sneers a little. No religious instruction is allowed in these schools, for democracy in France is at war with clericalism. The result is that there is much complaint, and rival schools, established by private effort, are numerous. The Catholics alone have raised for their schools in Paris over 15,000,000 francs in the last six years, and at the present time educate in their schools one-third of all the school-children of Paris. As to how these public

primary schools are supported, the report summarizes thus: "The communes had formerly to maintain their primary schools out of their own resources, supplemented, if necessary, by an addition of four centimes to the four direct taxes for the commune; further supplemented, if still necessary, by an addition of four centimes to the four direct taxes for the department; supplemented finally, if still necessary, by a grant from the state. These eight centimes for the commune and department have now been made regular and fixed taxes paid to the state. Since 1882 the state has relieved of all further charge for their primary schools those communes which could not meet such charge out of their own resources. Only the five chief cities of France have undertaken so to meet it,—Paris, Lyons, Marseilles, Bordeaux, Lille. In all the other communes of France the cost of primary instruction is met out of the public taxes by the state. When, therefore, it is asked how the lower classes feel the weight of the expenditure on education, the answer must be, so far as they feel their share in the general taxation of the country to be increased by it. And this probably they do not feel at all."

Mr. Arnold found a very large increase, both in the outlay for primary schools and in the number of children attending them, since he last saw them in 1859. At present the state bears nine-tenths of the annual expense of primary instruction, and spends over 80,000,000 francs on it. The municipality of Paris had, in 1884, 361 primary schools, with accommodations for 121,798 scholars.

The second subject of inquiry related to the quality of the education given; and Mr. Arnold speedily found that the suggestion of his official instructions, that he determine this by having the teachers set papers in arithmetic and dictation on the model of those set in England, could not be carried out, because the whole spirit and course of teaching was opposed to setting in school-hours a number of sums, and leaving the children to do them by themselves. So Mr. Arnold determined to secure an answer to this question by seeing and hearing what the scholars did; and the popular schools of the free city of Hamburg he chose for the test. He concludes that in German schools, as a rule, the programme is fuller, the course longer, and the instruction better, than in England. The methods of teaching seemed more gradual, more natural, more rational, on the continent than in England. He wrote again and again in his notes, '*The children human.*' As to the school course at Hamburg, we read, "The fixed matters of the course are religion, German language, English language, object-lessons, his-

tory, geography, natural history, arithmetic and algebra, geometry, writing, drawing, singing, and gymnastics. English must be taught in the popular schools from the third class upwards, and French comes in as an optional matter (the only one), and to take it the consent of the *oberschul-behörde* is required. The two lower classes have each of them 26 hours of schooling a week, the class next above them has 28, the four higher classes have 32 each. Some of the popular schools in Hamburg, like those in Berlin, meet once a day only. In summer the schools meet at 8 in the morning, and the different classes go on till 12, 1, or 2 on different days in the week, so that each class shall make its proper number of weekly hours. In winter they meet at 9 and go on an hour later. No week-day is a holiday, like the Saturday with us and the Thursday with the French. Other schools have two daily meetings, from 8 to 11 or 12, and from 2 to 4, the proper number of hours for each class being again always made. Local convenience determines whether the school shall have two daily meetings or one. The pressure which the long attendance from 8 to 2 or from 9 to 3 would seem likely to exercise is remedied by an arrangement which I found general in German countries, and which works very well. At the end of each hour the class disperses to the corridors and playground, and the teachers to the teachers' meeting-room. In ten minutes a bell rings, and the classes and teachers re-assemble refreshed. How much the work of a long morning is lightened by this simple plan may be observed by any one of school experience who will pass a morning in a German or Swiss school."

In German grammar the children learn the declension of nouns, comparison of adjectives, and conjugation of verbs. In history, where the prescribed aim is to make the pupil acquainted with the prominent persons and points in the development of mankind in general, and of the German nation in particular, biographical notices form the principal subject-matter. In religion, parables and hymns are learned and said by heart, and instruction is given in the literary history and translation of the Bible. Everywhere in Germany Mr. Arnold thought the text-books used, good. The following passage merits quotation in full: "In the specially formative and humanizing parts of the school-work, I found in foreign schools a performance which surprised me, which would be pronounced good anywhere, and which I could not find in corresponding schools at home. I am thinking of literature and poetry and the lives of the poets, of recitation and reading, of history, of foreign languages. Sometimes in our schools one

comes across a child with a gift, and a gift is always something unique and admirable. But in general in our elementary schools when one says that the reading is good, or the French, or the history, or the acquaintance with poetry, one makes the mental reservation, 'good, considering the class from which children and teachers are drawn.' But in the foreign schools lately visited by me I have found in all these matters a performance which would be pronounced good anywhere, and a performance, not of individuals, but of classes. At Trachenberg, near Dresden, I went with the inspector into a schoolroom where the head class were reading a ballad of Goethe, 'Der sänger.' The inspector took the book, asked the children questions about the life of Goethe, made them read the poem, asked them to compare it with a ballad of Schiller in the same volume, 'Der Graf von Habsburg,' drew from them the differences between the two ballads, what their charm was, where lay the interest of the middle age for us, and of chivalry, and so on. The performance was not a solo by a clever inspector: the part in it taken by the children was active and intelligent, such as would be called good if coming from children in an altogether higher class of school, and such as proved under what capable teaching they must have been. In Hamburg, again, in English, and at Zurich in French, I heard children read and translate a foreign language with a power and a pronunciation such as I have never found in an elementary school at home, and which I should call good if I found it in some high-class school for young ladies. At Zurich, I remember, we passed from reading and translating to grammar, and the children were questioned about the place of pronominal objects in a French sentence. Imagine a child in one of our popular schools knowing, or being asked, why we say *on me le rend*, but *on le lui rend*, and what is the rule on the subject!"

And the instruction is better in foreign schools, because the schools are better organized, and the teachers better trained, than those in England. This brings us to the third general subject treated in the report,—the status, training, and pensioning of teachers.

To begin with, it may be safely said that teachers in Germany, France, and Switzerland, come from the same class of society as do teachers in England. For mention of all that is interesting and valuable in Mr. Arnold's report about the training of teachers, we have no space: but we give an abstract of the training in a typical instance, in Saxony.

The training-school course there lasts six years.

But a youth enters at the age of about 14, with the attainments required for passing an examination for the *entlassungs-zeugniss*, or certificate of discharge, from a *mittlere Volksschule*, or popular school of the second grade, — a school which in Saxony must be organized in at least four classes, with a two-years' course for each. In the training-school, instruction and lodging are free; a small sum is paid for board, but a certain number of free boarders, 'gifted poor children,' are admitted. To the training-school is attached a practising school, organized as a *mittlere Schule*, a middle school with four classes and 155 scholars. In this school the students see and learn the practice of teaching. Their own instruction they receive in small classes which may not have more than 25 scholars. Their hours in class may not exceed 36 a week, not counting the time given to music. The matters of instruction are religion, German language and literature, Latin, geography, history, natural science both descriptive and theoretical, arithmetic, geometry, pedagogy including psychology and logic, music, writing, drawing, and gymnastics. All of these matters are obligatory, but after the first year students of proved incapacity for music are no longer taught it. One-third of the teaching-staff of the training-school may be distinguished elementary teachers without university training, but this proportion is never to be exceeded. Each teacher, exclusive of the director, is bound to give 26 hours of teaching in the week. There are half-yearly examinations: the six years' term may be lengthened by one year for a student who is deemed not ripe for the leaving examination, which comes at the conclusion of the course. At the end of the course, when the student is about 20 years old, he undergoes the *schulamtskandidaten-prüfung*, or examination for office. The examination is both oral and in writing, and turns upon the work of the student's course in the training-school. The examining commission is composed of the Minister's commissary, a church commissary, and the whole staff of the training-college. The staff conduct the examination, the Minister's commissary presides and superintends. If the student passes, he receives his *reifezeugniss*, or certificate of ripeness, and is now qualified to serve as assistant in a public popular school, or as a private teacher where his work has not to go beyond the limits of popular school instruction. After two years of service as assistant, at the age of about 22, the young teacher returns to the training-school and presents himself for the *wahlfähigkeits-prüfung*, or examination for definitive posting. For this examination the commission is composed of the Minister's commissary, a church commis-

sary, the director of the *seminar*, and either two of its upper teachers, or else other approved schoolmen named by the minister. This examination again is both written and oral. Mr. Arnold attended the oral part on two days, and heard and saw candidates examined in religion, music, German language and literature, the history of education, pedagogy, psychology, logic, and school law.

Training-schools for women are much less numerous in Germany than those for men, because women are much less used in teaching than men; the presumption being that women cannot teach satisfactorily certain matters of instruction in the upper classes of a popular school. The result is that in Prussia there are 115 training-schools for men, and 10 for women; in Saxony, 16 for men, 2 for women.

As to teachers' salaries and pensions, custom and law vary greatly. In Prussia in 1878 the average salary of a schoolmaster was £51 12s. per annum. In Berlin the average salary was £103 3s. In France the primary-school teachers must rise through a series of grades, to each of which a fixed salary is attached, varying from £36 to £48 for a man, and from £28 to £36 for a woman. If a school-mistress marries in Germany, she loses her situation. In all the countries visited by Mr. Arnold, teachers have retiring pensions, to establish which a deduction is made from their salary.

In respect to the fourth and last subject of inquiry, that as to compulsory attendance, Mr. Arnold quotes Saxon law as representative for all the countries visited by him. It is thus: "Every child has to attend, for eight years uninterruptedly, the common popular school in the school district where it resides; as a rule, from the completion of the sixth year of its age to the completion of its fourteenth. Children who by the end of their eighth school year do not attain due proficiency in the principal matters of instruction, that is to say, in religion, the German language, reading, writing, and arithmetic, have to attend school a year longer. The holidays for the popular schools in Saxony are fixed by law, and amount to 44 days in the year. In general the school meets for a minimum of three hours in the morning and of two hours in the afternoon. 'Parents and guardians are bound,' says the law, 'to keep children of school age to a regular attendance in school hours. As a general rule, only illness of the child, or serious illness in the child's family, is ground of excuse for its missing school.' Absences, with their causes, are entered daily by the teacher in the school registers. At the end of every month he hands a list of them to the managers, whose chairman has to bring, within

eight days after the end of the month, all punishable absences to the notice of the magistrate, if he has not previously brought the parents to their duty by an admonition, or had the child fetched to school by the school beadle, to whom a small fee is due from the parent for his trouble. If, however, the matter goes before the magistrate, this functionary inflicts a fine, which may go as high as 30s., and if the fine is not paid the penalty is changed to one of imprisonment. In Saxony the law prescribes that the number of scholars in a class shall not exceed 60, and that the number of scholars to one teacher shall not exceed 120. In schools with from 60 to 120 children, therefore, if the commune is not rich enough to do more in the way of providing teachers than the law actually requires, two classes are formed, and a reduction of school time takes place for each, in order to allow the one master to conduct them separately."

The rural population greatly prefer the half-day school, as it is called, because they thus have the older children at their disposal for half the day.

Mr. Arnold concludes his valuable paper with three comments: 1. The retention of school fees is not a very important matter; something can be said for and against it, but the weight is in favor of their retention; 2. Keep improving our schools and studying the systems of other countries; 3. Organize the secondary instruction not only in the interest of that instruction itself, but in the interest of popular instruction. This last remark applies with peculiar force to education in the United States.

Mr. Arnold's report is free from official dryness, and reads more like an essay than a government document.

THE EDUCATIONAL INSTITUTIONS OF PRUSSIA.

DESPITE all that has been said and written in this country during the past few years concerning the respective merits of the *gymnasium* and the *realschule*, there are very few educators who are able to describe accurately the character and relative status of the various educational institutions of Prussia. Therefore the following summary will be of value.

At the head of the education department in Prussia is the minister of education, whose duty it is to look after the administration of church matters as well. In each of the twelve provinces of Prussia is a *provinzial-schul-collegium*, having charge of the secondary schools. The elementary or primary schools are under the supervision of district boards, of which there are from two to

five in each province. Every commune is compelled by law to build and support a number of elementary schools sufficient to provide primary instruction for all the children of the community. Where the means are not sufficient, a grant is allowed by the central government. The assistance of this sort given in the year 1885 amounted to nearly 21,500,000 marks. The inspection of these elementary schools is very thorough; and every teacher, no matter what his grade, must have passed a government examination. In the towns a rector is placed over the teachers; in the country a local school inspector, usually a clergyman, acts in the same capacity. These rectors and local inspectors are under the surveillance of district inspectors. Gradually laymen are superseding clergymen as incumbents of these district-inspectorships. The district inspectors report to the district boards, and these themselves not infrequently overlook the inspectors' work. In the eye of the law, all schools, no matter what they teach, that have no *berechtigung*, — a term used to express the privilege of preparing students for an examination the passing of which shall absolve from part of the full period of military service, — are elementary schools. All schools having *berechtigung* are classed as high schools, and are under the administration of the above-mentioned *provinzial-schul-collegien*; and in this way the high schools are very closely connected with the military system. After 1812, military service was made compulsory for every Prussian. The period of service in the standing army is three years; but those who have received a higher education have the privilege of serving one year only, if they apply to the authorities at the proper time. These are the so-called 'one-year volunteers' (*einjährige freiwilliger*). They receive no pay, and must keep themselves. In order to increase the intellectual standard of the army, and also to reduce expenses, the high schools have the right (*berechtigung*) to grant certificates for one-year volunteers.

These high schools are of various kinds, and include, 1°, the *gymnasien*; 2°, the *pro-gymnasien*; 3°, the *real-gymnasien* (formerly known as *real-schulen* of the first class); 4°, the *real-pro-gymnasien*; 5°, the *ober-realschulen*; 6°, the *realschulen*; 7°, the *higher-burgher schools*, and a few industrial and agricultural schools.

The *pro-gymnasium* is merely a *gymnasium* without the highest class, and the *real-pro-gymnasium* and the *realschule* stand in similar relation to the *real-gymnasium* and the *ober-realschule*. Those students who have satisfactorily attended for one year the second class of a *gymnasium*, *real-gymnasium*, or an *ober-realschule*, or the first class of a *pro-gymnasium*, a *real-pro-gymnasium*,

or a *realschule*, are entitled to a one-year volunteer certificate. In the case of the *higher-burgher schools*, and such others, excepting the above named, as have the right to grant the certificate, its acquisition is made to depend on the final examination at the completion of the course.

The following table will show the various studies pursued in the several kinds of higher schools, and the proportion of time allotted to each. The figures represent the number of hours per week — taking all the classes together — given to the subjects named :—

	Religion.	German.	Latin.	Greek.	French.	History and geography.	Mathematics.	Description of nat. objects.	Physics.	Chemistry.	Natural history.	Writing.	Drawing.	English.
Gymnasium.....	19	21	77	40	21	28	34	10	8	—	—	4	6	—
Real-gymnasium.....	19	27	54	—	34	30	44	12	12	6	—	4	18	20
Ober-realschule.....	19	30	—	—	56	30	49	13	14	9	—	6	24	26
Higher-burgher school.....	13	21	—	—	40	22	29	13	—	—	8	8	12	13

Singing and gymnastics are taught in all these schools after the regular school-hours, which are from eight to twelve, and from two to four o'clock, and Hebrew is similarly taught at the *gymnasien* to future students of theology.

It will be observed that the *real-gymnasium* differs from the *gymnasium* in teaching no Greek, in adding English to the course, and in reducing the time given to Latin. The time thus taken from the classics is given to French, German, mathematics, physics, chemistry, and drawing. The *ober-realschule* omits Latin and Greek entirely, greatly increases the instruction in French, and adds to the courses in English, drawing and the sciences. The higher-burgher schools have only a six-year course instead of a nine-year, and the studies occupy the times shown in the table. Some of these secondary schools have *vorschulen* attached to them. Into the secondary schools, children do not enter before the completion of the ninth year; and they are required to possess an ability to read easily Latin and German text, a knowledge of the parts of speech, a legible handwriting, ability to write a dictation exercise without too many mistakes in spelling, an accuracy in using the four fundamental rules of arithmetic, and a general acquaintance with the historical events narrated in the Old and New Testaments.

Besides the *berechtigung* for one-year volunteers, which all these high schools possess under the conditions named above, certain other privileges

as to positions in civil life are possessed by them, but these privileges are by no means the same for all.

The final examination certificate (*reifezeugniss*) entitles the holder to the following privileges :—

I. That of a *gymnasium*, 1°, to enter any university, and to compete in any examination for positions in the higher divisions of the civil service; 2°, to enter the technical high schools for engineering at Berlin, Hanover, and Aix-la-Chapelle, and to admission to the government examinations for engineering in all its branches; 3°, to

enter the academies of mines at Berlin and Clausthal and the affiliated technical high school at Aix-la-Chapelle, and to admission to the examinations for the first-class certificates in the departments of mining and smelting; 4°, to enter the academies of woods and forests at Eberswalde and Munich, and to admission to the higher examinations in this department; 5°, to admission to the first-class posts in the post-office, from postmaster-general downward.

II. That of a *real-gymnasium*, 1°, to attend lectures at a university with a view to matriculating in the philosophical faculty for the purpose of pursuing the study of mathematics, the natural sciences, or modern languages; 2°, to admission to the examinations mentioned under I., 2°, 3°, 4°, 5°.

III. That of an *ober-realschule*, 1°, to admission to the examinations mentioned under I., 2°; 2°, to admission to the same studies and examinations to which the certificate of a *real-gymnasium* entitles, on condition of passing a special examination in Latin.

IV. That of a *real-pro-gymnasium*, chiefly to unconditional admission to the highest class (*prima*) of a *real-gymnasium*.

V. That of a *realschule*, 1°, to nomination for civil-service posts in provincial administration and in the railways; 2°, to nomination to clerkships in the department of mines and smelting; 3°, to nomination as a land-surveyor; 4°, to admission

to examinations for apothecary, on condition that Latin has been an obligatory subject.

VI. That of a *pro-gymnasium*, 1°, to admission to the examination for apothecary; 2°, to admission to industrial technical schools.

VII. That of a *higher-burgher school*, 1°, to attend an industrial or technical school; 2°, to nomination for junior clerkships in the law courts; 3°, to admission to the examinations for art teachers; 4°, to admission to the high school for music in Berlin; 5°, to nomination for junior posts in the post-office.

The high schools are supported by the state, by the commune, or by both. If supported by the state alone, they are known as royal high schools. In the budget for 1885-86 the state subsidy for the high schools amounted to 4,712,118 marks.

THE SOURCE OF THE MISSISSIPPI.

THE readers of *Science* will recall our announcement a few weeks ago, of the despatch of an exploring party to the head waters of the Mississippi River to examine and locate all the streams and lakes tributary to Lake Itasca. Our explorers have now accomplished their task, and we have received from them a detailed report, and a map of the entire region, which includes the basin of Lake Itasca.

This map, which we have engraved on the scale of about one mile to the inch, divided into sections corresponding with the U. S. land-office surveys, is presented herewith. Other maps are also presented for the fuller explanation of the details of the report.

Preliminary to the report, it is proper that we should make some statement of the considerations which led to the despatch of this party. There have been a number of explorations and excursions to the head waters of the Mississippi during the present century. Of these, we have a more or less accurate record of the trip of Morrison in 1804; of Schoolcraft in 1832; of Nicollet in 1836; of Charles Lanman in 1846; of the Ayers in 1849; of William Bungo in 1865; of Julius Chambers in 1872; of A. H. Siegfried and his party in 1879; of W. E. Neal in 1880 and again in 1881; of Rev. J. B. Gilfillan and Professor Cooke in May, 1881; and of Captain Glazier in July, 1881. We also have the maps of the government surveyors who spent two weeks in this township in September and October, 1875, and the paper of Mr. O. E. Garrison, contributed by him to the tenth annual report of the State geological survey of Minnesota, for the year 1880.

Of these explorers, we know that Nicollet carefully explored all the feeders of Lake Itasca; that

Chambers explored Elk Lake, which he called Lake Dolly Varden; and that Messrs. Gilfillan, Cooke, and Morrison, proceeding from the south, also visited the sources of the lake lying in that direction. Therefore, as to the general facts regarding the size and character of the basin of the lake, we did not hope to add any considerable amount of information to that already possessed. But of all these parties of explorers and surveyors, it is safe to say, that, with the exception of Nicollet and the government land-office surveyors, there has been little attempt at accurate investigation. Only these two have added any thing material to what Schoolcraft told the world in 1832. It is well, therefore, to note the difference in methods, of these two principal explorations of the Itasca basin.

"Nicollet was a trained scientist, but he worked under limitations; and very sensibly, also, with a limited and definite purpose. His work was mainly done alone, and his chief instruments were the thermometer, the barometer, the sextant, and the compass. Hence he gives us details of temperature, elevation, latitude, longitude, and the general direction of the parts he visited. He rarely used the chain—if, indeed, he carried such a piece of property. His details of distance were either estimated—as in the case of a day's tramp or of an object within sight—or figured out by mathematical rules, as when he computed the length of a section of the river from the data of the latitude, longitude, and the direction from each other of a given number of points in its course. Hence his outline of the course of a river or creek, or of the form of a lake or pond, was only as accurate as might be expected from a trained explorer, whose eye was accustomed to take in and measure distance, direction, and form, on a large scale, and under a thousand varying conditions. In the matter of general relief forms, and the general trend and drainage of the country, he was, without doubt, the best equipped and most competent single explorer who has undertaken the study of our country; and his work has been of inestimable value to hundreds of thousands who never heard of his name. So far as relates to the subdivision of areas, and the surveying and platting of the surface of the land, considered as a horizontal plane, his work did not profess to have any accuracy or value whatever.

"On the other hand, this last is the chief, if not the only, object of the government land surveyors. Their instructions are limited and specific. They take no note whatever of relief forms: they follow up and trace only the streams and ponds intercepted by the boundary-lines of sections. In the matter of horizontal area, in the meandering

of lakes and navigable streams, and in the general platting of the land, they are proverbially reliable; but there is absolutely no account taken of elevation, and the drainage or trend of the land can only be inferred from the course and direction of the streams encountered in running the section lines.

"Nicollet's exploration was made in 1836, before a surveyor's stake had been set within the limits of Minnesota. The government surveyors of 1875 perhaps never heard of Nicollet, and certainly had no thought of supplementing or verifying his work."

In addition to the discrepancy noted above, another element of uncertainty has been introduced by the effort to maintain the claims of Captain Glazier as the discoverer of a new lake, unknown before his visit to the Itasca region in 1881. In order to maintain this claim, it is necessary to set aside entirely the map of Nicollet, to discredit the work of the government surveyors, and to ignore Garrison, Siegfried, Gilfillan, and every other explorer who has been to this region during the last half-century. With a dozen trustworthy parties on one side, maintaining the general accuracy of Nicollet and the government land-office map, and with Captain Glazier and his friends alone on the other side, it was not difficult to decide where the truth lay. But as no one had yet attempted to make an accurate survey of the topographical features of this region in the light of a government survey, and as Nicollet's work was simply topographical, without any attempt at accurate platting of areas, there was plenty of room for Captain Glazier, or any one else who chose, to come in and advance all sorts of claims. If, as was claimed by Mr. Pearce Giles on behalf of Captain Glazier, there was found three or four miles south of Lake Itasca another tributary lake, two miles long and a mile and a half wide, this certainly could not be Elk Lake, or any other lake laid down in the government survey. But if, as described by another of his friends, Captain Glazier's lake was less than half a mile south of Lake Itasca, it was undoubtedly Elk Lake,—the same that Nicollet shows, with its three feeders, on his map deposited in the office of engineers at Washington,—the same that Chambers visited and named Dolly Varden in 1872,—the same that the government surveyors accurately outlined and named Elk Lake in 1875,—the same that the Rev. Mr. Gilfillan and Professor Cooke explored and named Lake Breck in May, 1881.

But it was not simply to prove or disprove the truth of Captain Glazier's claim, that we made this effort at an accurate topographical survey of this region. Nicollet has furnished us with a

map and a report of his explorations of the sources of the Mississippi, and these explorations have been a matter of history for fifty years. His maps have been public documents, accessible to everybody; and we believe, that, if his work is to be discredited, it should only be after the most careful and accurate survey. The government surveyors also were charged with having entirely overlooked a lake of more than a square mile in extent, lying several miles south of Lake Itasca. If these government officers are not to be relied upon to give us accurate maps and honest service, it is time that the people should know it; it is time that geographers and map-makers should know it; and we knew of no way so satisfactory as a careful review of the work, both of Nicollet and of the government surveyors. And this review afforded us an opportunity to correct the one by the other, in case they were each reasonably correct in their respective fields of work.

We are glad to be able to report that the most careful running of the lines of the government surveyors have proved the almost absolute accuracy of their work. Our explorers were also able to detect and to account for some interesting minor inaccuracies of the land-office plat of this township; but it was well worth the making of the error to discover the remarkable natural phenomenon whereby this was fully explained. We refer to the underground passage of the stream on the section line between sections 21 and 22, by which the government surveyors were deceived, and led into thinking that the stream did not pass out of section 22 at all, but kept north through the western part of that section.

It is also a cause of satisfaction to find the substantial accuracy of Nicollet's report and map of this region. There are, it is true, manifest discrepancies between his lines and those of the government survey. Lake Itasca is much broader, Elk Lake much smaller, proportionally on his map than on the map of the government survey, and the latter is found to be correct. A large share of this variation is due to the fact that Nicollet made his surveys by the eye entirely, and many of his drawings of the course of the streams and the contour of lakes were made upon birch-bark, and only transferred to paper afterwards. But beside this explanation, our explorers also found reason to believe that Itasca Lake was at one time several inches higher than it is now; and if, on the other hand, Elk Lake was once of a lower level than now, the two coming together would account for the difference in form they exhibited in 1836, as compared with their present outlines.

According to Mr. Gilfillan, the Indians called

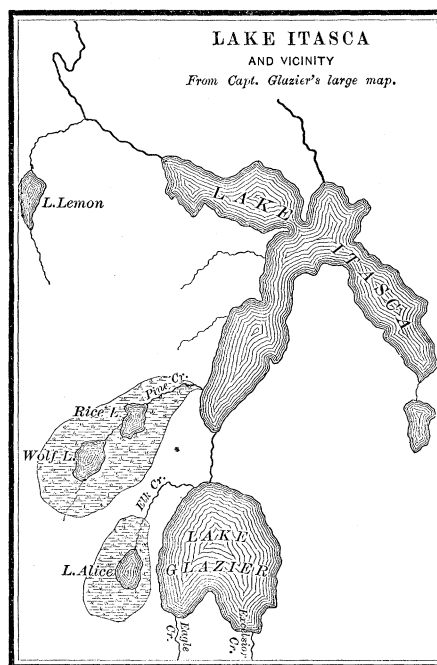
Elk Lake, *Gabukegumag*, which means, 'water which juts off to one side' of another lake; that is, branches or projects out from it like a finger from a hand. This would indicate, that, when this name was given to it, Elk Lake was simply an arm or bay putting out from Lake Itasca, and that with the filling-up of the channel between the two, and the lowering of the level of Itasca, the difference in level, which amounts to only thirteen inches, contributed to make the one lake distinct from the other, and a feeder to it.

We may briefly sum up the results of this exploration to be:—

1. The confirming of the substantial accuracy of the government survey.
2. The proof of the general correctness of Nicollet's report and map.
3. Nicollet's creek is still by far the largest affluent of Itasca, contributing about three-fourths of the regular perennial inflow of water.
4. It can be traced beyond the point to which Nicollet followed it to the lake that heads in section 34, Tp. 143 N., R. 36 W. 5th meridian; and at this point it is 92 feet above the level of Lake Itasca.
5. Following its windings, it is also the longest tributary of Lake Itasca; and therefore,
6. As the largest and longest tributary stream, and the one most elevated in its source, it is entitled to be called the upper course of the Mississippi.
7. Considerable changes have taken place in the nature of the streams in this region since the exploration of Nicollet, but these are all easily accounted for by natural causes.
8. The principal tributaries of Lake Itasca are fed by springs, artesian in their character, which have their reservoirs in the strata of the hills, and in lakes and ponds probably miles to the south and west.
9. There is no large lake directly tributary to Lake Itasca, five, four, three, or two miles, or even one mile south of that lake; and Elk Lake, whose shore is only a stone's throw from Itasca (350 feet), is the only tributary lake within the Itasca basin which has an area of more than 40 acres.
10. Elk Lake, with its feeders, is clearly shown on Nicollet's map of 1836-37. Its position is more accurately given than on Glazier's map; its distance from Itasca is much nearer to truth; and as to its size, Nicollet has drawn it about as much too small as Glazier drew it too large.
11. Captain Glazier has added nothing to what Nicollet's map presents to us. On the other hand,

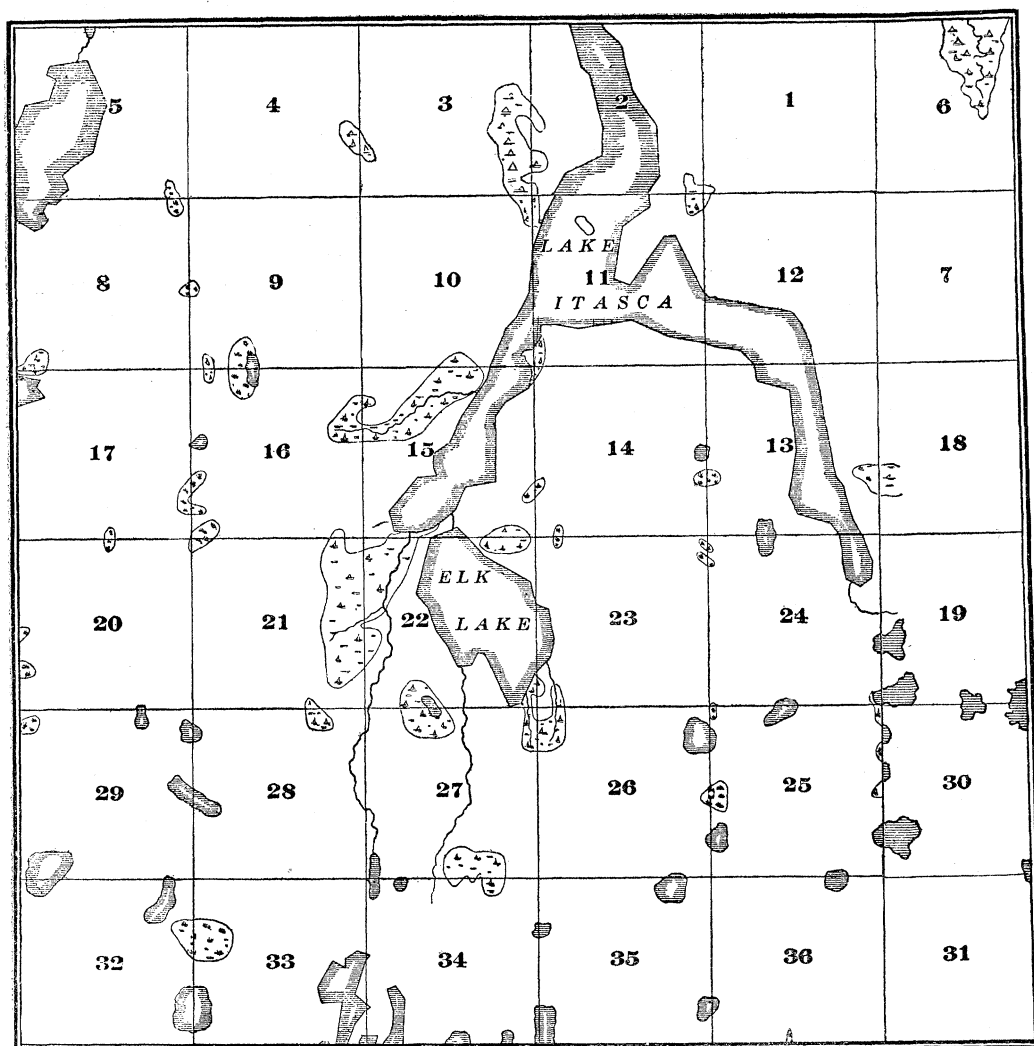
12. Glazier shows us nothing of Nicollet's creek which is the main tributary of Itasca; nothing of the eastern feeder of Elk Lake, which is the main source of its waters; nothing whatever that is not misleading and worse than worthless.

But what is the use of seriously going over this subject? Whatever of merit or accuracy there is in Captain Glazier's map is not in the slightest degree due to any thing done by him, or to any erudition possessed by his guide, Che-no-wa-ge-sic. His map, as he has published it, was drawn and engraved by Mr. G. Woolworth Colton of this city, and was made as near like the government surveys as Captain Glazier would permit.



The public will never be permitted to gaze upon the miserable travesty on geography and map-making which Glazier took to Mr. Colton to be doctored up and put in shape. But it will be interested to read Mr. Colton's account of how he became the innocent accessory of the Glazier fraud. The following is an extract from a published letter of Mr. Colton, to be found in the *American canoeist* for November, 1886:—

"When Glazier came to me in the fall of 1882 with his very rough map, to talk of his claim and to give us the geographical data for adding his streams and lake to our maps, I saw at once that

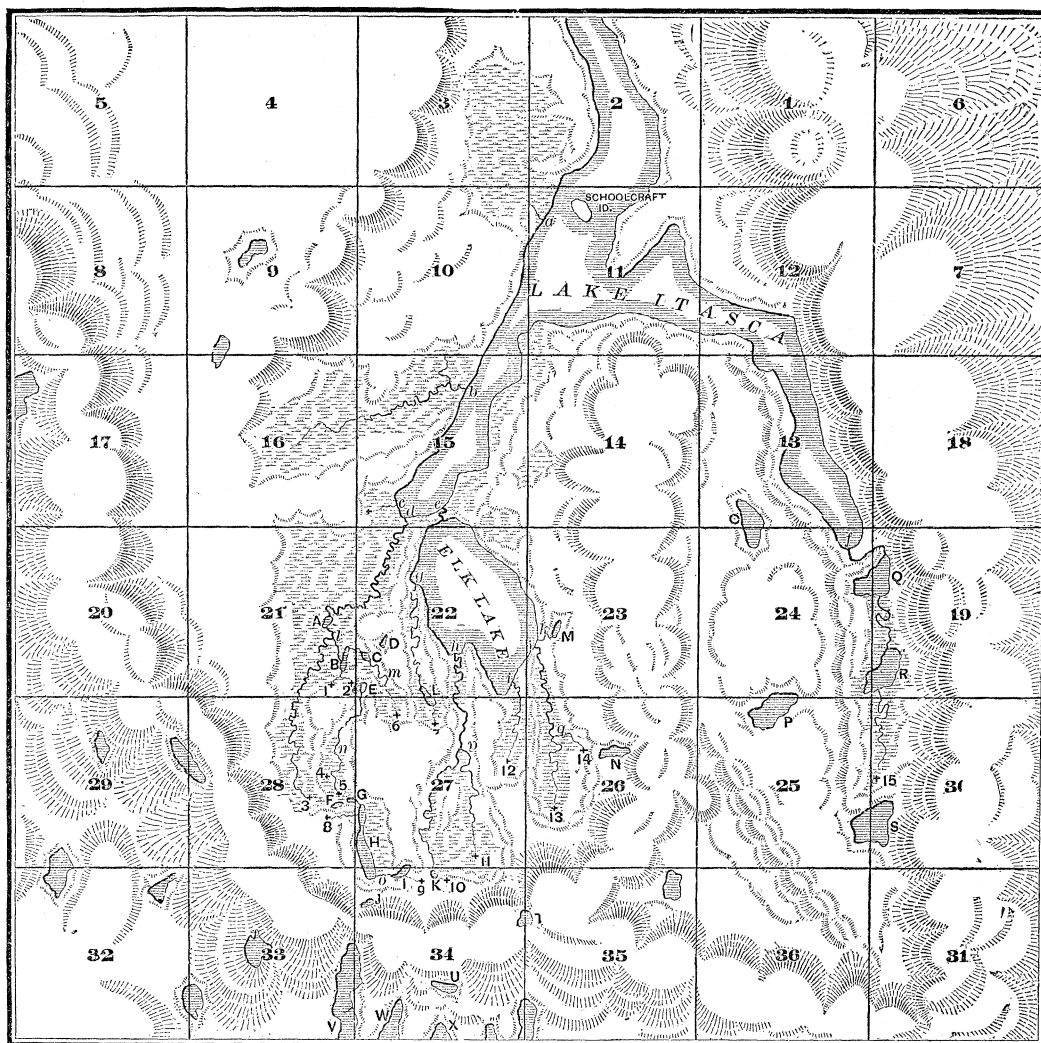


THE ITASCA LAKE REGION, REDUCED FROM THE OFFICIAL PLATS IN THE U. S. GENERAL LAND-OFFICE, WASHINGTON, D. C., AS SURVEYED IN SEPTEMBER-OCTOBER, 1875.

he was claiming what did not belong to him, and so told him. Then I referred to my copy of U. S. land surveys (of which I copy *every one* that enters the general land-office in Washington, on a scale of one mile to one inch, with my own hand), and showed him, under date of March 20, 1876, my copy of sectionized plats, covering not only the region referred to, Nos. 142 and 143, N. R., 36 W., 5th Pm. mer., but all the rest of the area covered by his route to and from the lake. He expressed surprise at the facts shown him, and said he regretted exceedingly that he had not known them before he went, for such maps would have helped him greatly in determining many questions of geography, etc. He concluded to

have his maps engraved, and requested me to add some things and correct others, such as the form and proportion of lakes, etc., and to make more general resemblance to facts, only he insisted on having what he calls Lake Glazier much larger than the *meandered* exhibits on the L. O. plats. The result of my attempts to improve his draught was to make the resemblance to facts greater, and at the same time, as now appears, to give greater strength to his claim of exploration, and to accurate knowledge on the part of his guide."

And now, finally, to settle once for all the worth of Captain Glazier's claim, Mr. Bartlett Channing Paine comes into court, and, *as state's*



THE ITASCA LAKE REGION, AS SURVEYED BY HOPEWELL CLARKE, CHIEF OF THE I. B. T. & CO. EXPEDITION, OCTOBER, 1886.

evidence, gives the following testimony in a recent interview in the *St. Paul Pioneer press*:—

"I wanted to avoid this controversy, but I suppose I might as well tell you whatever I can. Yes, I accompanied Mr. Glazier on his journey at a stipulated salary per week. I went along to write up the incidents of the trip. I suppose Mr. Glazier's object in taking me along was to give a more extended notoriety through what matter I might furnish the press. When we left for the starting-point of our journey, our objective point was Lake Itasca. Glazier had no idea of exploring any lake beyond that point. The idea first entered his head when we were part way between Brainerd and Leech Lake. There

we met an old man who told us that Itasca was not the farthest lake, and that there was another one a little beyond Itasca. Glazier then began inquiring among the Indians, and he finally found one who seemed to know all about this lake. He had, according to his story, grown potatoes on the bank of the lake. That settled it: so Captain Glazier decided to see this lake. We struck Lake Itasca about halfway up the south-east arm, and paddled to Schoolcraft's Island. Next day we made our camp a short distance from the end of the south-west arm to the lake that the Indians had told us about. Glazier was greatly delighted with the lake. We sailed around it till we came to the promontory shown in the map. There the captain made a great speech about the

discovery of the source of the Mississippi. When he finished his speech, I, on a suggestion previously made by him, proposed that the lake be named 'Lake Glazier.' The third member joined in the suggestion, as did the Indians. That night we began our return journey, and when we reached St. Paul I went up and examined the charts in the surveyor-general's office to see if the lake was an actual discovery. I found it was on the government maps, but I did not tell Glazier. Why? Oh, well, I thought I would let him think he had made a discovery. I accompanied him to the Gulf of Mexico. He had no more claim to the discovery than you have. Mr. Glazier recently wrote to me, asking if I had any objections to his using my signature to a few communications to certain newspapers or magazines. I replied that I had. There has since appeared an article in the December number of *Outing* on the subject of this controversy. It had my name attached, but I don't know by whom it was written. I didn't write it. In Mr. Glazier's recent letter I see that he puts forth the statement that the lake was named 'Lake Glazier' contrary to his wishes, and that he desired the Indian name 'Pokegama.' That statement is not true. The captain was not only anxious, but extremely solicitous, that the lake should be named 'Lake Glazier.' Captain Glazier took no observations at Elk Lake. He had no instruments with him."

As to the name of Elk Lake, the former surveyor-general of Minnesota, who had charge of the government land-office at St. Paul, states, that, acting in accordance with his general instructions from the government, he called it Elk Lake, in order to retain the designation originally used by the Indians for the larger lake, which Schoolcraft named Itasca. We certainly think that the official designation should stand.

It will be noted that the map shows parts of two adjoining townships. The six eastern sections (square miles) are in township 143 N., range 35 W., and the other thirty sections are in township 143 N., range 36 W., 5th principal meridian.

It only remains for us to say that we can most thoroughly vouch for the care and accuracy with which this exploration has been made. Mr. Hope-well Clarke, the chief of the party, has long been one of the most experienced and capable land explorers of the N. P. R. R. Co. In this service he has spent years in inspecting the timber, and verifying the work of the government surveyors throughout the immense land-grant of that company. We placed at his disposal every instrument for an accurate determination of elevations, levels, and drainage, which could be desired for the most complete execution of his work. He had in his party two capable assistants; and we place the record of their exploration before the public, satisfied that it is the conscientious work of the very

best men whom we could command for the important task which we undertook to accomplish.

IVISON, BLAKEMAN, TAYLOR, & Co.

THE REPORT.

MESSRS. IVISON, BLAKEMAN, TAYLOR, & Co.

753 Broadway, New York.

Gentlemen, — I herewith submit my report of the trip to the head waters of the Mississippi, undertaken in your interest in the month of October last. Among the causes of delay in forwarding this paper, were my sickness immediately after my return from Itasca; the great quantity of facts contained in my field notes, which I desired to condense as much as possible; some mishaps which always enter more or less into such undertakings; and a great pressure of regular work in the line of my daily duties consequent upon my absence and illness.

The route which I selected for my trip was by N. P. R. R. to Morley; thence by stage to Park Rapids; and the balance of the way by wagon conveyance to the south-eastern arm of Lake Itasca.

The company consisted of three persons,—one a trained land-explorer, a second to serve as driver and general assistant, and myself as the leader of the party. I had originally planned taking others with me; but I am satisfied, that, with the amount of work we had to do, it would have taken twice as long with help not accustomed to the woods, and I am afraid we would have killed a green man, travelling and working as we did. So, though at first I was disappointed at the loss of one or two whom I had expected to have with me, I am satisfied that the party would not have been better made up than as it was.

In the matter of equipment for measurements and for observations, we had the following: pocket-sextant, aneroid barometer, drainage-level, Locke's hand-level, thermometers, surveyor's compass and chain, levelling-rod, pocket-compasses.

We arrived at the south-eastern arm of Lake Itasca at noon on the 13th of October, and after taking dinner embarked at once for the south-western arm, which we proposed to make the centre of our operations. We approached this portion of the lake with considerable curiosity, and as we drew near our journey's end we stopped a few moments to admire the scene before us.

Directly in front, a small, bare, mound-like elevation or knoll rises from the edge of Lake Itasca near the centre of an open space of about ten acres between it and Elk Lake. The inlet of the principal stream flowing into Lake Itasca is seen on the right, and the outlet of Elk Lake comes in at the left, of the knoll. We are looking south-

ward; and to the right the shore of the lake is lined with pine, while the left shore and all the upper (southern) end is bordered with tamarack, except the open space in front, which is bare except for a few bushes and some rice-grass. The Height of Land is in plain view two miles and a half to the south; and between these hills and the knoll there is a peculiar light familiar to woodsmen, which indicates an opening or water beyond. It is a striking scene. There is nothing like it anywhere else on the shores of Itasca. And while looking at it, our thoughts went back to the time Nicollet was there; and we could not but reflect that Francis Brunet, or Kegwedzissag, his Indian guide, would call his attention to it, and no doubt they landed and explored Elk Lake before they went in any other direction. The moment we saw this open country between the lakes, we were satisfied that no man accustomed to the wilderness, certainly no explorer of Nicollet's experience, no guide as trained as his Indian was, could go there on the business on which they were engaged, and miss seeing Elk Lake, unless he were blind.

As night was rapidly approaching, we landed, and selected a place for camp in the open space between the two lakes; and while one of my assistants was busy pitching camp, and the other prepared supper, I employed the time till dark unpacking and adjusting my instruments, and planning the work for the following days. In all, we spent five days exploring and surveying the basin of Itasca. Wherever there was especial care and detail required, we gave our best and most diligent efforts to the work, and I believe there is no material point regarding the sources of the feeders of Lake Itasca which is not covered by this report.

In presenting the results of our work during our stay at Lake Itasca, I shall not attempt to report the operations of each day, but rather state the general conclusions and facts obtained from the thorough exploration of every part of the basin of the lake.

In following the heights of land which form the southern boundary of the basin of Lake Itasca, the general trend of the crest is from north-west to south-east; but it takes a course almost directly east after striking the north-east quarter of section 33, as shown on the map. It also sends out spurs, one striking northward from section 35, and another, also northward, from section 31 in the eastern of the two townships shown. The spur striking north from section 35 divides the Itasca basin into two parts, the western furnishing the feeders of the south-western arm of the lake, and the eastern furnishing the

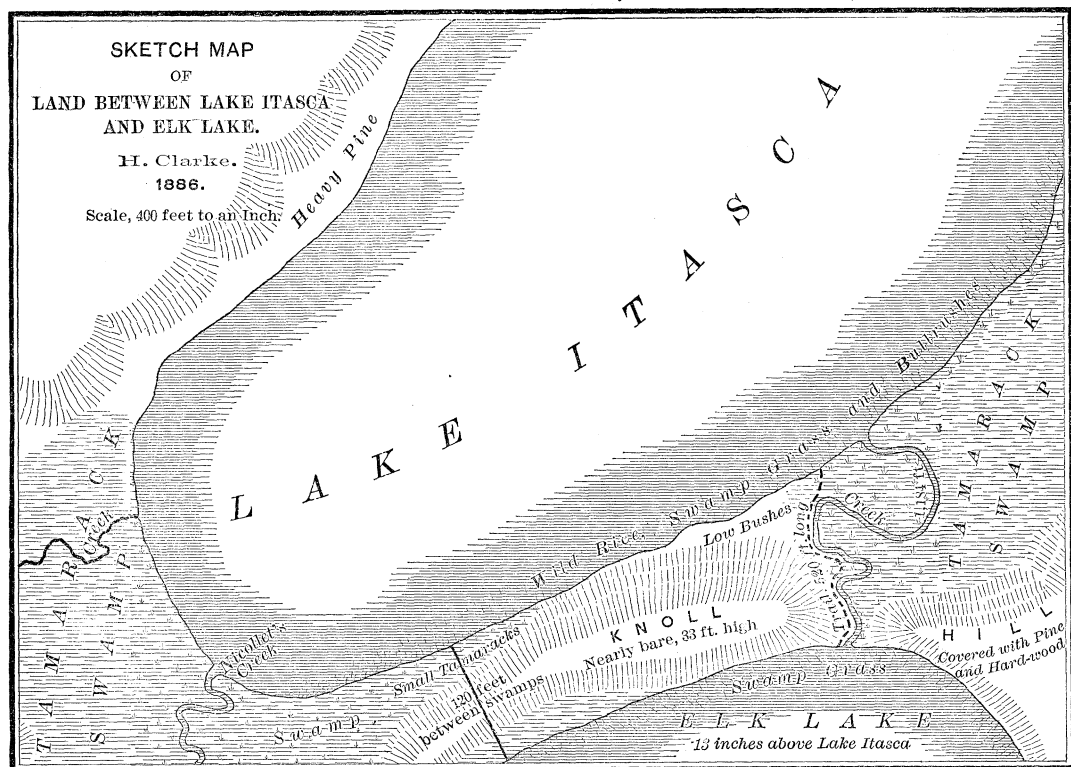
single feeder of the south-eastern arm. It is not an unbroken ridge of hills, nor are these spurs perfectly defined; but they are, rather, groups and successions of hills, with the general direction given above. There is also a marked difference in the character of the springs of these two parts of the Itasca basin. The western bowl furnishes the feeders that are steady and constant during the year, and the largest feeder lies at the extreme western edge of this bowl. The eastern bowl furnishes a single feeder, which is probably nearly dry parts of the year. It is thus evident that the western streams are fed mainly by living springs, artesian in their character, being supplied by water which comes through the strata of the earth from ponds to the west and south, some of them, perhaps, miles away. The single stream of the south-eastern arm simply drains the bowl in which it flows, and while in the rainy season it may be quite a torrent, part of the year it is comparatively dry. I regard this as important in determining the ultimate sources of the waters of the upper Mississippi, it being evident that all the water which flows into the river from Lake Itasca is either surface drainage or comes from reservoirs and ponds which lie between the head waters of the Mississippi and the head waters of the Red River. To the north the elevation of the crest of the Height of Land varies from 150 to 250 feet above the level of Lake Itasca. In the western half of section 21 the height is about 200 feet; in sections 28 and 33 it rises to 225 and 250 feet; in section 34 it is 250 feet in the west part of the section, and 200 feet in the eastern; 175 feet in section 26. In section 23 the height is 100 feet, sloping gradually to 75 feet in section 14. The knoll in the western part of section 22 is 150 feet above the level of the lake. To the north, along the border of Elk Lake, the ridge is 90 feet high. Just south of the lake marked *D* the elevation is 120 feet, and just north of the lake marked *E* it is 100 feet. These data are sufficient to show the irregular and broken character of the land in this region.

One of the most interesting parts of our work was the survey and examination of the narrow strip of land between Lake Itasca and Elk Lake. We found it to be 350 feet wide at the narrowest point between the lakes, and 520 feet measuring along the crooked trail at the base of the knoll. The lakes run nearly parallel for 1,020 feet, and the strip of land contains in all about 10 acres.

The portion shown as hilly on the plat is a small mound-like elevation, nearly devoid of all timber, which rises with a gradual slope south from Lake Itasca to a height of 33 feet, and descends abruptly to the shore of Elk Lake. Its direction between

the lakes is nearly east and west. Its height above Lake Itasca at its western base is 10 feet, where it is less than 100 feet wide; and thus, if each lake were a little higher in elevation, they would at this point be within 100 feet of each other. The highest point on the trail between the two lakes is 12 feet. The ridge extends to the outlet of Elk Lake, from which point Lake Itasca is in full view. Another hill rises to the east of the outlet, leaving an opening 12 feet wide, through which the stream flows with a rapid cur-

nothing from springs along its route, and its increased width and depth are caused by back water from Lake Itasca. It is a very pretty little stream, and has been cleared out by the Indians, who go there annually and place fish-traps to catch the fish that run between the two lakes. The difference in elevation between the two lakes is 1 foot and 1 inch. The stream between the two lakes falls 6 inches between Elk Lake and a point where it enters the tamarack swamp, in the first hundred feet of its course; the balance, 7



rent, in a channel 6 feet wide and 6 inches deep. The balance of the land between the two lakes on either side of the creek, is a tamarack swamp. The outlet of Elk Lake flows nearly north-east 80 feet, and enters the tamarack swamp, where its general direction is north for 600 feet, until it reaches a point within 110 feet of Lake Itasca. It then curves back toward Elk Lake, and finally enters Lake Itasca, its whole course from Elk Lake measuring 1,084 feet. Where it debouches into Lake Itasca, it is 7 feet wide and 8 inches deep. We noted its width at numerous places in its course, and found it to vary from 6 to 12 feet, and its depth from 2 to 8 inches. It gains

inches, measures the fall in its course through the tamarack swamp of nearly 1,000 feet.

Leaving this interesting part of the lake for a time, I will give some details in regard to the other feeders of the lake. The stream entering the south-east arm, as above remarked, is evidently quite variable in its character. At times, apparently, it is very shallow; but after heavy rains it is quite a torrent, and drains the lakes which form during the wet season, marked Q, R, and S. When the stream is at its best, it is fully 6 feet wide and a foot deep. The stream entering Lake Itasca at a is merely a sluggish creek, draining the marsh to the northward in sections 23 and

10. The stream entering at *b* rises in a swamp on section 16, and is joined by a branch in section 15, which rises in section 10. There are numerous springs along its course, and it is 8 feet wide and a foot deep, at its mouth discharging as much water into Lake Itasca as the outlet of Elk Lake does. The inlet at *c* is a small brook, 2 feet wide and a foot deep, that rises in a swamp less than a quarter of a mile from the lake.

This brings me to the largest feeder of the lake, the one entering at *d*. It is 16 feet wide and $2\frac{1}{2}$ feet deep at the place where it enters into Itasca, and is the stream mentioned by Nicollet, in his report of his explorations in 1836, as "the one remarkable above the others, inasmuch as its course is longer and its waters more abundant; so that, in obedience to the geographical rule that the sources of a river are those that are most distant from its mouth, this creek is truly the infant Mississippi; the others below, its feeders and tributaries." The exploration of this stream was the most complicated and difficult of our undertakings, and it was with considerable difficulty that we were able to identify the three lakes which Nicollet describes; but while on the ground, and after the most careful study of the problem, we came to the conclusion that Nicollet's three lakes were those marked on the map as *A*, *B*, and *C*. At first sight, it would seem, from Nicollet's description, that these could not be the ones he referred to; and I have given much study to the points involved, endeavoring to reconcile his descriptions with some other theory. We followed the stream to the first lake at the edge of the hills and through the swamps; and the course of the brook is two miles in length, and seemed like four. Distances on the ground double up very fast when one follows crooked streams, as you will remember when you compare the length of the stream between Elk Lake and Lake Itasca (1,040 feet) with the actual distance between the two lakes (350 feet). If we add to the actual length of the course of the stream from the lake *A* to its outlet at *d*, which is in reality 2 miles, the difficulties that Nicollet encountered in wading through the tamarack marsh, we can easily believe that this is the course which he describes as 'two or three miles' in length. His report makes the distance between the first and second lakes comparatively short, and that between the second and third lakes still shorter, so that there is no other lake which answers the description for the third or higher lake but the one marked *C*. This, however, is not the source, at the present time at least, from which Nicollet's stream draws its principal supply of water; and to find that source, after considerable exploration, we were obliged to

go to a lake which has its head in the north-western quarter of section 34. This is the utmost source and fountain head of the water flowing north into Lake Itasca. The lake itself is fed by numerous springs along its borders, and its surface is 92 feet above the level of Lake Itasca. The small inlet from the lake marked *I* was dry when we visited it, but water runs through it in the wet season. The hills south rise from 20 to 160 feet high, and water has never flowed over them northward. It might be interesting to know how far it flows under them. It is certain that it does, but there is no way to trace its course or distance. All the streams in this part of the basin rise in springs in tamarack swamps, which undoubtedly are fed by water percolating under the hills from lakes and swamps beyond; and no doubt the group of lakes, *U*, *V*, *W*, and *X*, in the southern part of sections 33, 34, and 35, which spread out to a considerable extent in sections 3, 4, and 5 of the townships next south, are the reservoirs which feed a number of these springs. Beginning with the lake marked *H*, it spreads northward nearly half a mile. At its northern end the water flows out of this lake in a stream $1\frac{1}{2}$ feet wide and 1 foot deep, and, running west about 200 feet, empties into a small lake about 2 acres in extent, marked *G*. This lake connects with another of the same size about 20 feet to the west of it.

At the time we were there, both ponds were full of moss and bogs, and apparently almost dried up, the abundant inflow of water running out by underground passages as fast as it came in; but both lakes show that at some seasons of the year they contain 4 feet more of water, caused by the increased flow in the springtime and in the rainy season. At this time the underground passages are not large enough to carry the water off, and so it accumulates and the ponds fill up. Apparently they once had a surface outlet which is now closed by a beaver dam. The water flowing from the two lakes feeds the two springs numbered 3 and 5. Proceeding to the spring marked 5, we find the water bubbling up and flowing away in a rapid, lively stream, in a direction generally northward. It is fed by springs along its course until it reaches the extreme south-western corner of section 22, where it is $2\frac{1}{2}$ feet wide and 8 inches deep, and discharges into a small pond of about 5 acres in extent. This pond is the most remarkable one in the course of the stream; it has no surface outlet, and, from the formation of the land about it, apparently has never been any larger than it now is; but, with the large volume of water flowing into it, we perceive that it must, of course, have a steady

and sufficient outlet underground. This we found to be toward the west, where it bursts forth in an immense spring or pool, marked 2, in the extreme south-eastern quarter of section 21. The lowest point on the hill between the pond and the spring is 12 feet above the level of the pond; and the water, dropping underground, bubbles up in the swamp 200 feet away and 33 feet below that level. You will notice that the stream thus passes underground from section 22 into section 21, and is therefore invisible to one following up the course of the section line, — a fact which will be referred to again in a latter portion of this report. Proceeding from the spring marked 2, the water flows in a north-westerly direction, and empties into the lake marked *B*, — the second one of Nicollet's chain of lakes. The outlet of this lake is on the west side, a stream 3 feet wide and a foot deep, which is joined at a short distance by another from the south. Following up the stream, which joins the main one on section 21, we find it rises on section 28 at a spring marked 3, evidently fed by an underground passage from the pond *F*. These streams are re-enforced throughout their course by springs which ooze from the bases of the hills that line the tamarack swamps; so that, when the creek leaves lake *A*, it flows with a brisk current 12 feet wide and 1 foot deep, which is further re-enforced by numerous springs all the way to Lake Itasca. At the point of its discharge into the lake, it is a broad, well-defined stream, 16 feet wide, and $2\frac{1}{2}$ feet deep at its deepest point. Lake *A* is ten feet above the level of Lake Itasca.

Recurring to the subject of Nicollet's three lakes, I recall the fact that Nicollet states, that, at a small distance from the heights where the head waters originate, they unite to form a small lake, from which the Mississippi issues with a breadth of $1\frac{1}{2}$ feet and a depth of 1 foot. "*At no great distance, however,*" so Nicollet says, "*this rivulet uniting with other streamlets, supplies a second minor lake,*" so we were obliged to look for the upper of the three lakes at a reasonably short distance from the lake *B*. If the spring, numbered 2, would fill the bill as a lakelet, it would meet all the other requirements of the case perfectly. The only alternative seemed to me to be the lake marked *C*. At present the outlet of this lake is obstructed by two beaver dams, and no water flows from it except what little may percolate under these obstructions. Its principal feeder, marked *m*, rises in a spring in section 27, and is also nearly dry, but there is a small amount of water flowing through its channel. I leave it to you, or to future explorers, to settle the question as between the spring 2 and the pond *C*.

There are four small streams flowing into Elk

Lake. The first one rises in a spring, the outlet of which flows into a small pond 50 feet in diameter in the north-western quarter of section 34. It leaves this pond a brooklet 6 inches wide and 2 inches deep, and flows with a rapid current to the centre of section 37, where it is joined by another and larger branch coming from a tamarack swamp in the south-eastern quarter of section 27. At the point where it flows into Elk Lake it is 2 feet wide and 6 inches deep. The elevation of the source of this stream at the spring marked 10 is 88 feet above Elk Lake and 89 above Lake Itasca. The *largest* stream flowing into Elk Lake rises in the north-western quarter of section 26 in a spring marked 13. This is joined, at a short distance from its source, by another branch, which is supplied by a small lake in section 26, marked *N*. The outlet of this lake is by an underground current, it being closed by a beaver dam; but water has flowed out by a surface outlet at some period, perhaps at the time of Nicollet's visit. Where the main stream enters Elk Lake it is 3 feet wide and a foot deep. This lakelet *N* in section 26, and its outlet, were to me among the most interesting things found in this region. To my mind they prove conclusively that Nicollet not only explored Elk Lake, but also its feeders. Referring to the copy of his larger map, which you sent me, I find just such a lake laid down at the head of a small stream flowing into Elk Lake from the south-east. This is the most important feeder of Elk Lake, just as Nicollet indicates it to be. The other two streams flowing into Elk Lake are quite small, and originate as shown on the map. We found a dry channel between the lake *M* and Elk Lake. No water was flowing from this lake, although it probably does discharge some water in the spring and when the water is high. In measuring the amount of water supplied by the various tributaries of Lake Itasca, we found the three streams discharging at *b*, *d*, and *e*, furnishing practically all the perennial water-supply of the south-western arm of the lake; and of this I would estimate that Nicollet's creek furnishes $\frac{3}{4}$, and the other two, each about $\frac{1}{4}$.

THE WORK OF THE GOVERNMENT SURVEY.

It was an important part of our task to observe the posts and blazings left by the government surveyors, and we carefully ran the main lines with the view of detecting any errors that they might have made. In this part of their work, and also in meandering of the two lakes, our examination proved their work to be correct in every material point. A singular mistake, however, on the government plat, is easily accounted for. The course of the stream from lake *H* until it crosses the south

line of section 22 is substantially correct as laid down on the government map: but, when they ran the line between sections 21 and 22, this stream was not crossed again, and they naturally supposed it ran due north through the western edge of section 22, and that the stream flowing out of section 21 into 22 was a branch running into the main stream; whereas this is the main stream, which, passing westward under their feet into section 21 by an outlet which they did not see because it was underground, takes its course through the eastern part of section 21, and crosses into section 22 again at the point where the government surveyors had indicated a feeder to the main stream. The two small lakes *C* and *D* on section 22, and the two *A* and *B* on section 21, would not be crossed by a section line: hence they were not indicated by the surveyors. At a point where the section line between sections 21 and 28 crosses the branch of the spring flowing out of section 28, the course of the stream is through a boggy swamp, and it would hardly be noticed as the stream without going a considerable distance north or south of the section line: hence it is not shown on the government maps, but in place of it is shown a marsh. In all other respects the work of the government surveyors is well done. Their business was to establish section corners, blaze lines between the sections, note all lakes intercepted by the section lines, meander lakes of more than 40 acres in extent, note streams crossed and indicate their apparent direction, etc. Trifling errors will creep into their work; but, when we take into consideration the difficulties they have to contend with, it is not to be wondered at.

Another part of the duty of the government surveyors is to indicate the names of streams and bodies of water, and, in case no modern name has been given to them, to retain the Indian name or its English translation. Following this rule, the name of Lake Itasca, being generally accepted, was retained.

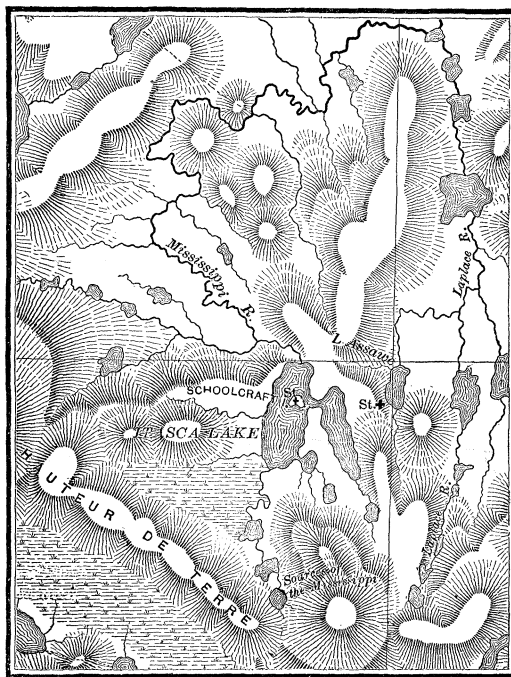
With regard to the name of Elk Lake, Mr. Hall, who was the chief of the surveying party of 1875, recently told me that when he was surveying township 143 N., range 36, he met an Indian trapper at Lake Itasca, who had made this region his trapping-ground for years. He asked him the Indian name of Lake Itasca and Elk Lake, and the Indian gave him the name of 'Omushkos,' or 'Elk,' for the lake in section 22, and another name, which Mr. Hall has forgotten, for Itasca. As Lake Itasca had a name already, he simply recommended to the surveyor-general the name 'Elk Lake' for the other body. But the Indians are by no means agreed upon the designa-

tion for these lakes. They certainly gave Mr. Schoolcraft the name 'Omushkos' for Lake Itasca, and to Mr. Gilfillan, 'Gabuwegumag' for Elk Lake. The latter term signifies 'water that juts off to one side' of another lake; that is, branches or projects out from it like the fingers from the hand.

Other travellers have found still other designations applied by the Indians to these lakes. Surveyor-general Baker, in fixing the name finally to be applied to the lake, considered, that, whether 'Omushkos' was the original designation of Elk Lake or of Lake Itasca, it was worth while, in the absence of any other fitting name, to retain that designation for the lake which was not yet named. I am certainly of the opinion that the name should stand.

NICOLLET'S MAP, ETC.

It is fitting to say a few words in regard to Nicollet's map and possible changes, past and



ITASCA LAKE AND VICINITY. FACSIMILE COPY OF NICOLLET'S MAP DEPOSITED IN THE OFFICE OF ENGINEERS, U.S.A., 1836-37.

future, in the Itasca region. Careful investigation along the shores of Lake Itasca shows plainly that some time in the past it has been 9 inches higher than it is at the present. This rise would be sufficient to overflow all that portion of the

land shown as tamarack on the plat of land between Elk Lake and Lake Itasca, and back the water up to the narrow strip of high land on the outskirts of Elk Lake, thus bringing the lakes within 80 feet of each other. Whether this was the case when Nicollet was there, I will not attempt to answer. His map would seem to indicate that it was, by the fact that he shows the two lakes so closely connected, Elk Lake so much larger than it is, and the two arms of Lake Itasca so much out of proportion with their present outline. But this can readily be accounted for on other grounds. The shores of the south-eastern arm are abrupt and bluff, while the shores of the south-western arm are low and swampy. This makes the south-western arm look wider than it is, and the south-eastern arm narrower than it is. The shores of Elk Lake are also abrupt and lined with bluffs, and to one looking south across it, it does not look half as large as it does to one standing on the hills south of it and looking north. Distances across water are always deceiving. The view from different points of Lake Itasca might be sketched by a dozen different parties, and no two sketches would look alike. My impression is, that Nicollet sketched the south-eastern arm of Lake Itasca from some point on its western shore and Elk Lake, and the south-western arm of Itasca from the knoll between the lakes; and when we take into consideration how insignificant is the distance between the two lakes, compared to the total length of both, it can readily be understood why he has shown them as though Elk Lake were a bay instead of a separate body of water. From the nature of the springs which feed the principal stream emptying into Lake Itasca, it is evident that very few changes have taken place in that part of the basin since Nicollet was there, and very few will take place in the next fifty years. The springs that feed it are supplied by underground currents and reservoirs from the lakes and the Height of Land, and, as they cannot be drained, no amount of settlement or clearing will change them. They are among the permanent features of the country. Lake Itasca of to-day is the same in its main features that it was when Nicollet was there, and for a hundred years before. Its level may have been a little higher, the surface of Elk Lake may have been a little lower, Itasca may have spread out over some acres more of marsh, Elk Lake may have been somewhat smaller in its surface extent; thus they may have come more nearly together, and nearer to being one continuous body of water. But the main features of this remarkable basin will remain the same for generations to come, and Lake Itasca will be then, as it is now, the first important reservoir of all the

springs that feed the head waters of the Mississippi River.

Our meteorological observations were taken with an effort at system; but it is sufficient, perhaps, to say that the atmospheric temperature varied from 20 to 70 degrees during the five days that we were at Lake Itasca, and that we had the extremes of clear weather and invigorating atmosphere, and of desolate, soaking rain. The severest storm overtook us when we were within 5 miles of Lake Itasca, and we passed a most unenviable night in an improvised camp. We took the temperature of the water in Elk Lake and Lake Itasca when the temperature of the atmosphere was 51° F., the temperature of the water being 46°. The temperature of the water in the second lake on Nicollet's creek was 42°.

Among the mishaps which invariably attend such explorations, were two that are worthy of note, — the loss of my revolver, and the leaving behind, unaccountably, of my copy of the Nautical almanac. I had intended taking the latitude of the northern end of Elk Lake, and also establishing a meridian and noting the exact variation between the true and magnetic meridian; but when I got on the ground, of course this was impossible without my tables. Still worse luck followed the observations with the barometer. I had arranged with Sergeant Lyon, of the U.S. signal service at St. Paul, to take simultaneous readings of the barometer. The instruments were adjusted together when we set out for Itasca, but, when we got back to St. Paul, mine read 200 feet higher than his. As there was no way of determining when this change occurred, all that work was of no account. As our first observations were taken at 6 A.M., and the last at 10 P.M., they involved considerable sacrifice of rest, which I am sorry yielded so little result.

The figures given in the first part of this report for the elevation of the crest of the Height of Land are therefore necessarily only approximate, as the variation in my aneroid barometer destroyed the value of my observations, on which I largely depended for this part of my work. The heights noted for elevations between the lakes and for the springs and streams were obtained by the drainage-level, and these may be relied upon as practically correct.

I considered it very fortunate that our trip was made just at the end of a long spell of dry weather such as has hardly been known in Minnesota for years. This enabled us to judge of the sources of water-supply that are perennial in their flow, as distinguished from the surface drainage in the spring and in the rainy seasons. The rain of the night before we reached the lake was

not enough materially to disturb these conditions.

The last thing we did before leaving our camp between the lakes was to erect on the top of the little knoll, in plain view from both lakes and from Schoolcraft Island on the north, a monument to the memory of Nicollet, on which was inscribed the following: "To the memory of J. N. Nicollet, who discovered the source of the Mississippi River, August 29, 1836." This was done after fully exploring the country for miles around; and our little party of three was fully satisfied that fifty years ago Nicollet had discovered all there was to discover of the sources of the Mississippi; and that if he had lived to complete his report on 'The sources of the Mississippi and the North Red rivers,' and to give to the world his unpublished map, there would have been no chance for any Glazier to confuse the geographical world, or to play tricks upon the learned societies of two continents. We found our work difficult enough, though we were only a day's ride from civilization and the railroad, and though the whole township had been marked off and blazed at every turn by the government surveyors. What, then, must have been the heroism of the invalid devotee of science, who buried himself for months in the unbroken wilderness, and gave his life to the exploration of the frontiers of his adopted country!

I have done my work without any prejudice or bias, and determined only upon finding out and stating the truth in regard to the sources of the great river of our continent whose exploration has commanded the service of so many worthy men in every period of our history.

As a preparation for the survey, I had read every thing I was able to gather on the subject, and I took with me tracings of all the maps of the region, either published or to be found in the government departments. The work has been done by actual survey, and in such a way that I believe it will bear investigation by any surveyor who wishes to check it.

HOPEWELL CLARKE.

Minneapolis, Minn., Dec. 7, 1886.

THE BRITISH SCHOOL AT ATHENS.

A WRITER in the *Athenaeum* states that the managing committee have now drawn up and will immediately issue a series of rules and regulations for this school. Its objects are declared to include, 1°, the study of Greek art and architecture in their remains of every period; 2°, the study of inscriptions; 3°, the exploration of ancient sites; 4°, the tracing of ancient roads and

routes of traffic; and, further, the study of every period of Greek language and literature from the earliest age to the present day. The students of the school will fall under the following heads: 1°. Holders of travelling fellowships, studentships, or scholarships at any university of the United Kingdom or of the British colonies; 2°. Travelling students sent out by the Royal academy, the Royal institute of British architects, or other similar bodies; 3°. Other persons who shall satisfy the managing committee that they are duly qualified to be admitted to the privileges of the school. Students attached to the school will be expected to pursue some definite course of study or research in a department of Hellenic studies, and to write in each season a report upon their work. Such reports are to be submitted to the director, and may be published by the managing committee if and as they think proper. Intending students are required to apply to the secretary, Mr. George Macmillan, 29 Bedford Street, Covent Garden, London. No person will be enrolled as a student who does not intend to reside at least three months in Greek lands. Students will have a right to use the library of the school free of charge. So far as the accommodation of the house permits, they will (after the first year) be admitted to reside at the school building, paying at a fixed rate for board and lodging. The managing committee may from time to time elect as honorary members of the school any persons actively engaged in study or exploration in Greek lands.

The director is to deliver at least six free public lectures at Athens during the season, and at the end of each season he is to report to the managing committee upon the studies pursued during the season by himself and each student. A sub-committee has been appointed to purchase books for the library so far as funds will allow. Presents of books or pamphlets will be gratefully received and acknowledged by the honorable secretary.

THE 'NATURAL METHOD' OF LANGUAGE-TEACHING.

No single word has created so great a confusion of thought as the word 'natural.' Its bare etymological meaning is plain enough; but its application is confined by the bounds of no dictionary, and its sense is as mutable as the shifting sands of the seashore. No other word has so often been used by writers as the convenient vehicle of their own individuality. 'Natural' is often simply what one desires from his own particular view to be natural. It is necessary, accordingly, always carefully to scrutinize its use, and thus to discover

from its special application the precise meaning it may bear.

Stripped of the mass of detail, a part of which, except by the sole right of assumption, does not specifically belong to it at all, the 'natural method' is, in ordinary phraseology, simply what its first advocate in this country called it, — the teaching of a language without grammar or dictionary, using the language to be taught as the medium of communication between teacher and pupil. Whatever its most enthusiastic votaries may claim for it, — and their claims are often even startling, — it is this, and no more. Since they were first formulated, the details of the system have grown by a not unnatural accretion, until they include a great mass of pedagogical material, some of which is about as much the especial property of the natural method as spectrum analysis is an individual prerogative of the pupils of Helmholtz. From one point of view, this is, perhaps, not to be deprecated; for, through the active proselytizing of its disciples, sound pedagogical principles have obtained a currency and found their way where otherwise they might not so easily have penetrated. On the other hand, it is, however, to be deplored as a categorical assumption of fact, to give plausibility to a theory which by no means finds universal acceptance. The name and claim of the method was in the first place, then, as it is given above. The substitution of the present name for the original title was, for its advocates, an extremely happy thought. In spite of some adverse testimony, there is something in a name; and a 'natural method' has attracted attention where 'language-teaching without grammar or dictionary' would have fallen unheeded.

Joseph Jacotot wrote, at a time when such sentiments as he expressed were somewhat revolutionary, what now might very properly be taken as a motto for the natural method: "Become a child, if you wish to make progress in studying a language; it is the quickest, the surest road to success." Whether Jacotot meant it literally or not, it is needless to question: certain it is that the formulators of the natural method not only cite it, but believe it, and incorporate it in their teaching.

There is no question as to the fact that a child readily learns a language from imitating, consciously or unconsciously, the speech of those about him. Every child with unimpaired faculties in this way acquires a vocabulary that steadily keeps pace with its increasing consciousness, — the vocabulary that can be used; the spoken vocabulary, of course, being always a little behind and in abeyance. It is a slow process at best, a matter of years, to learn a language in this way.

Its slowness, however, is, no doubt, due to the fact that simple cognition is of slow growth: cognition and language are growing together, but the former must necessarily precede. A similar process may take place, to a limited extent, at any time through life, if we add a new idea and an accompanying expression to our knowledge; if, for instance, we study medicine, an applied science, or law. Now, it is manifest that it is possible to be a child, in its purely literal meaning, but once. No assumed childhood will serve to place one, with regard to idea and its expression, in the position here described. The natural method cannot, of course, mean to do this at all. It fulfils, then, no particular purpose to write or to speak in the first lessons such sentences as a little child would naturally use in its first faltering speech. It is only necessary to have simple, short sentences, that are easy to understand and convenient to remember. If the natural method does not mean to teach a language in the manner that a very young child learns it (and it manifestly does not), it must base its terminology elsewhere.

It is a well-known fact that children easily acquire a language in addition to the one they have unconsciously learned. It is only necessary to have a French or German nurse, and in a comparatively short time the child with whom she is intimately associated is in possession of a French or German vocabulary; good or bad, according to the time spent with the nurse, who is communicative or uncommunicative, and speaks her own language well or ill. Unfortunately for us of older growth who have neglected its opportunities, the period of childhood is one of peculiar facility of imitation and receptivity. It never comes again in like measure. Here, again, it is impossible to be a child, and no end of sentences embodying ideas that do not rise above the first simple formulations of a child can suffice to put one in the attitude of a child.

It is possible, of course, by going to a foreign land, to place ourselves somewhat, after all, in the position of the child towards its nurse. If we are utterly cut off from communication with those who speak our own familiar language, the situation is even improved. We are then forced out of our own speech and into another; we are fairly obliged to acquire the new vocabulary, the new constructions, and the new idioms. But those of us who have tried it know that under the most favorable circumstances, and with the best and most constant opportunities for communication, even this is a slow method: it depends upon the individual, and the time of life, as to how slow it is. A German laborer, — Hauschildt, — a man of

some education and no end of general information, died a few weeks ago in one of the interior cities of the state. He had been in this country all of thirty years, but at the time of his death could scarcely make himself understood in English. His associations, however, had always been German: he had never cut himself loose from them, and even in a foreign land had still been a German among Germans.

The position last stated is plainly the one taken by the advocates of the natural method, and the one upon which is based their terminology. The pupil in the classroom is placed somewhat in the position of a stranger in a strange land. He is spoken to in a foreign language, and in the same language is expected to give his reply. Grammar and dictionary are unheeded, and upon this fact great stress is laid. It is a simple exchange of ideas, say its advocates, between teacher and pupil, resulting, in a surprisingly short time, in a complete mastery of the language the learner has been encouraged to use. By and by authors are read in the original. Curiously enough, in the last stages grammar is taken up, making thus its knowledge the capstone of the linguistic pyramid.

Now, there seems to be no reasonable doubt that instruction of this kind, if long enough continued, would ultimately result in giving to the pupil a certain knowledge of a language. He might learn, with limitations, to understand it, and he even might for a time speak it with some degree of fluency and correctness. This much must be granted. The pupil, however, has only arrived at this result by the expenditure of much valuable time that might have been better employed. The knowledge that he has acquired is inexact, and beyond a few parrot phrases it will improve the earliest opportunity to depart from him utterly.

The one great mistake of the natural system lies in its neglect to provide a suitable grammatical foundation for the superstructure it proposes to raise, — that it leaves for the top what it ought to have started with at the bottom. An argument is, however, in this way furnished in favor of the system, plausible, to be sure, but unreal and misleading. The teachers of the new method thus bring forward as an advantage that they do away with a text-book of grammar and its attendant drudgeries. One exponent of the principles of the system holds not only the supposed horrors of learning grammar, but of teaching it, hysterically up to the light, and exclaims, "Nothing can solace him (*the teacher*) for the *ennui* which grammars cause him: this is a suffering which kills, or at least shortens life, and takes from the mind all freshness and vigor."

There is no doubt but that there is some drudgery — call it that, if you please — connected with grammar. There is more or less of it in learning every thing else, — the alphabet, the multiplication-table, history, or any science. The natural method would here offer us a royal road to learning, and it is not strange that many will be found willing to traverse it. A foreigner, surrounded by people speaking a strange language, will indisputably learn to speak the language he constantly hears. If he hears it correctly, he will speak it correctly, without perhaps ever having heard that the language has a mass of inflections and syntactical agreements that some long-experienced scholar has carefully collected and summarized in a grammar. It is not, however, for a moment to be imagined that this supposititious person has learned his language either as rapidly or as well as if he had had a grammar to help him with its ready-made experience. The exertion of learning is not to be avoided, and has not been avoided; and the result is the same whether the process be drawn out and diluted with great expense of time, and foolish repetition, or condensed and abbreviated with such aids as are at hand. There is, for example, no avoiding the fact that the majority of French nouns ending in *al* form their plurals in *aux*, whether we learn the whole truth at one effort from a grammar, or whether we attain it finally by induction from individual examples. The acquisition, in the one case, is, too, just as real as in the other; the generalization learned from the grammar must also necessarily long precede its formulation by induction; and, having been thus incorporated in one's knowledge, it can immediately be put to use. A grammar saves time by simply categorizing forms; and it is not the rules themselves, it is their sure application, that is sought. All rules for language change can, of course, be established by induction after a sufficiently large accumulation of facts by experience; but, after such a complete knowledge of a language has been attained as might enable one to formulate general laws, the need of a general law has passed away. A purely inductive method teaches the words of a language individually and separately, and does not abridge the labor by treating them in classes. Grammar, according to the foregoing, is, then, to be considered, in a modern language particularly, simply as a means to a definite end. It is not the end itself, and it is to be greatly doubted whether any teacher of a modern language regards it so. It would be a very foolish and incompetent instructor who would endeavor to teach a language solely from the grammar, to isolate it from conversation and from its literature. A language

cannot be learned in this way. The writer previously quoted makes it a point that those who study grammar do nothing else. But surely no one contends that one can converse in French by knowing the rules for the use of, for instance, the demonstrative pronouns. What one does maintain, however, is, that, knowing the rules of grammar, one can converse correctly. You do not find, again, in a grammar, however complete it may be, the aesthetics of words; neither, if you are wise, do you seek for it there. The same prominent advocate of the natural method exclaims warmly, "I defy any teacher to make us realize these shades, this use so delicate of the subjunctive, from the grammars; they know nothing of the niceties of language." As if for a moment it were a question of doubt! To make grammar an end, or, to put it differently, to make a language an affair of rules and phrases, is an error, as every teacher of even moderate intelligence will admit. To use grammar in its proper way, as an auxiliary, as an aid to classify and formulate facts necessary to be known, is an abbreviation of labor that neither a teacher nor a learner can afford to despise. By what has been said it is not meant that a person shall go about with a grammar under his arm to which he might refer, or that he should always be ready with his rules by paragraph and number. Grammar is thoroughly learned only when it can be applied accurately and with apparent intuitiveness in the course of conversation or of writing; and when it can be thus applied in the case of a modern language, that is usually studied for itself rather than for the mental discipline that its study involves, then its purpose has clearly been fulfilled. It matters little to one if, having acquired a thorough speaking knowledge of German, he is unable to assign his nouns to their proper classes of declension. In reality, he no more consciously assigns them at all. His knowledge of the inflectional processes of the language has been thoroughly digested and assimilated. The learner has, nevertheless, saved time by the original categorization. As he has had, in the process of learning, a well-known rule of grammar at hand to authorize a form of expression, confidence, too, has been given him as to the reality of his knowledge, instead of a feeling of uncertainty as to whether he is right or wrong; and his knowledge is in every way better founded and more lasting. There is still another point to be noticed connected with this knowledge, or want of knowledge, of grammar. Two languages co-existing corrupt each other. It is inevitable that when two languages are spoken side by side, except perhaps in that facile period of imitation in early childhood, one should

influence the other. It depends upon circumstances which one is swayed the more, or, indeed, the process may be interactive. One has only to look for an illustration of this to the degeneracy of the German language as spoken by many Germans in America. It will be found, too, that those persons who are most influenced in this way are those who are most deficient in a knowledge of the constructive principles of their own language. If a foreign language is not a thing of constant daily habit, a learner will drift into error from precisely similar causes. Here, again, the rules of grammar, thoroughly learned, afford the only safe anchorage; and an early knowledge of them will conserve both time and labor.

In regard to the disuse of the dictionary by the advocates of the natural method, a word also may be said. By constant iteration on the part of the teacher, and endless repetition on the part of the pupil, a foreign vocabulary may unquestionably be acquired, but the result is by no means commensurate with the time or the energy expended. The only way to get a vocabulary is to learn it, whether by a series of repeated impressions extended over an indefinite time, or by a decisive exercise of memory that once for all grasps a classification. There is, it is to be willingly conceded, nothing quite so stupid or discouraging as to look out, at an early stage of the study of a language, every other word of a passage, in the dictionary. This difficulty may be obviated by furnishing a beginner's text with a special vocabulary, which, however, should be learned. It is an easy matter, as the study progresses, to select texts that shall only gradually increase in difficulty, and so keep pace with a continually widening vocabulary. There is, nevertheless, a distinct advantage to be gained from consulting the dictionary. It is an error, even in the case of a special idiom, to teach a word solely as the member of a phrase, or a few phrases, and not as a real entity that may be equally well used in other places. The dictionary here furnishes the proper corrective; and, as I have elsewhere written, the student will, by consulting it, "not merely exercise his faculty of discrimination in selecting, from among those nearly synonymous, the correct meaning demanded by the context, but he will unconsciously, at the same time, widen his vocabulary and his knowledge of the capabilities of the language."

As for the boasted advantage of the natural method, that instead of the intellectual barrenness produced by the use of grammar and dictionary it awakens interest by an immediate exchange of ideas, it is difficult to see what mental impetus

can be given, or what superiority of ideas be embodied in such phrases as, "Here is the finger. Do you see the finger, madame? Yes, you see the finger, and I see the finger. Do you see the finger, monsieur?" etc. The whole vocabulary of simple words and their combinations, as given in 'Causeries avec mes Elèves' or 'Plaudereien,' it may be asserted without partiality, and as the result of careful computation, could be learned by a moderately energetic pupil in about one-half the time it would require him to read through these books. In other words, had the same amount of time and labor been bestowed upon a system with grammar and dictionary at its back, the direct results would have been as great again, and the utility of the acquired knowledge for its effect upon the future would, in accordance with what has been said, have been many times as great.

The natural system is not only not the ideal nor the best way of language-teaching, as its apostles desire us to believe; it is not even a good way, if the results it furnishes are considered with regard to the time spent in their acquisition. It is not meant that the system is throughout bad. Its great fallacy is, that it rejects as worthless the generalizations of grammars, preferring, instead of starting out on the journey with a well-filled wallet, to depend wholly upon what can be gained along a not always productive way. Its redeeming feature is, that it makes conversation, even if often trivial, such an important factor in instruction. Grammar is not a universal panacea for all linguistic ills, and surely no teacher of a modern language, in these times of pedagogical enlightenment, disputes for a moment the unmistakable advantage of abundant exercise in conversing and using the language taught, or of living as much as possible in its atmosphere. In learning a foreign language, one of the greatest difficulties to overcome is the tendency to translate bodily, word for word, idioms and all, from your own language into the new. Conversation here is clearly the only substantial corrective; for it would require a peculiarly observant mind to get these shades of usage from literature, even of the most conversational nature. The grammar of such speech as is here supposed might be faultless, but every sentence none the less unintelligible.

If the neglect of grammar at the outset is the hopelessly weak side of the natural method so called, and its practical use of conversation is its strong one, a combination of grammar — of the use of a text-book of grammar — with conversation in the language taught, would result in a method of study in every way more admirable and worthy of adoption. Other points, to be sure, in the elaboration of such a method, would also

necessarily receive attention. The natural system promises too much return for the outlay made by the pupil; and just here may be sought the secret of its temporary popularity. It is, however, not real enough and not systematic enough. Learning a language is an affair of memory. To know it, one must remember the vocabulary and its correct combinations. It is a mistake to suppose that a person can imbibe knowledge without conscientious and continuous exertion. A royal road leading to the domain of language would be a good thing, but it has not yet been discovered. If instead of the natural method could be put a rational method embodying the principles already hinted at, results better, more real, and more lasting would indubitably be gained. Such a method would have a text-book of grammar as its cornerstone; it would not constitute it the whole fabric, for then its very purpose would be defeated. It would have extracts, furnished at the outset with a special vocabulary which would be learned, and later on it would inculcate a use of the dictionary. It would, above all, use the language taught at every possible opportunity, and make its practical acquisition the one end in view. Lastly, it would take wherever it find them all pedagogical methods of undoubted value, and incorporate them in its instruction. The grammar and dictionary are effete in modern language instruction if they are taught for themselves alone. Regard them as they should be regarded, as auxiliaries, and employ them in that way, and a rational method will give results that the natural method cannot hope to approach, either in breadth or in reality of actual knowledge.

"The castle which conservatism is set to defend," writes Emerson, "is the actual state of things, good and bad. The project of innovation is the best possible state of things." It is not, however, to be inferred from this that conservatism is always to be decried, or that all innovation is necessarily good. WM. H. CARPENTER.

OUR GOVERNMENT.

PROFESSOR MACY'S book is on the face of it a text-book. It is therefore to be judged by its adaptability to the purposes of the classroom. In a hundred and ninety-one pages, the author undertakes to answer three questions about our government, — how it grew, what it does, and how it does it. That an answer to each of these questions is essential to a satisfactory exposition of our governmental system, cannot be doubted; nor is it less certain that the difficulty of condensing the necessary matter within the limits of a convenient

Our government: how it grew, what it does, and how it does it. By JESSE MACY. Boston, Ginn, 1886.

classroom manual has thus far proved an insuperable obstacle to the production of a really excellent work of that sort. We are inclined to the opinion that Professor Macy has more clearly demonstrated the existence of this obstacle without successfully surmounting it.

The arrangement of topics adopted by the author is unusual. After a general introduction, in which is sketched the development of Germanic institutions, from the primitive *tunscepa* in Sleswick to the modern constitution of the United States, the reader is conducted through 'Matters chiefly local,' 'Administration of justice,' 'Federal executive business,' and 'Legislation,' to a final consideration of 'Constitutions.' The wisdom of thus reversing the customary order of presentation is doubtful. The moving cause in Professor Macy's mind was probably the idea of conforming to the order of historical development. Throughout the book, indeed, marked prominence is given to the origin and growth of the institutions described. But that the old Germanic township was the seed from which our higher governmental forms have sprung, seems to us no good reason why the modern local organizations should take precedence of the higher authorities that make and unmake them. It is likely to be misleading to the student to thus disarrange the order of political importance. The most logical method of presentation for the American reader is to begin with state institutions, and proceed down to the local and up to the national. Professor Macy himself recognizes this in a measure; for he recommends that the book be taken up in reverse order when a class is reviewing it.

Another feature of the book that will trouble the teacher is the very excellence of its answers to the question how our institutions grew. A textbook should be suggestive; but Professor Macy's sketches of the growth of various forms of governmental activity suggest too much. Nothing short of a complete course in the early history of institutions will enable a class of young students to appreciate, or even to understand, many of his chapters. His summaries are admirable, and could be made of service as the outline for a series of lectures; but, for class-work in an ordinary academic course, they are too sketchy.

In general, it is our opinion that the descriptive part of the work is subordinated too much to the historical. The chapter on juries, for example, contains eleven pages of matter relating to the development of the system in England, with descriptions of the customs of ordeal, compurgation, recognition, and trial by battle, and with a discussion of the relative weight of English and French influence in determining the final form of

the institution. The only reference to 'our government' in the chapter is contained in two lines at the end, stating that "the jury system was established in America by Englishmen, and is found in nearly all the states" (p. 78). For a class of students not learned in the law, we submit that some description of the jury system as it now exists, with some notice of the methods of drawing jurors, would be quite as profitable; nor could it be said to be less pertinent to the subject of the book.

While exception may thus be taken to some features of Professor Macy's work (and it must be admitted that the faults seem to result rather from the aim than the execution of the book), too much praise cannot be bestowed upon the clear, concise, and vigorous style of the author. As a practical book of reference for a teacher of civil government, it will be of great and permanent value. The 'suggestions' which are appended to each chapter show that the author himself is a teacher who understands his business, and they will be in many cases more useful than the text.

W. A. DUNNING.

ECONOMICS FOR THE PEOPLE.

Economics for the people. By R. R. BOWKER. New York, Harper, 1886. 16°.

OF Mr. Bowker's successful attempt "to set forth the principles of economics so as to make them plain and interesting to all readers, illustrating them from American facts, so that at the end of the book the reader will have a fair knowledge of the economic history and condition of our own country," little but what is good can be said. The book is certainly interesting, it is sufficiently full for its purpose, and it is unusually fair and temperate. Once or twice the author's personal opinions seem to come into collision with what most of our people consider established facts, but these are not stated in a way to attract very general attention. For example: on p. 70, while admitting in one sentence that under the protective tariff an enormous silk industry has been built up in the United States, and the price of the product greatly reduced, in the very next sentence Mr. Bowker says, that, "as silk is a luxury, no great hardship is worked by the increased price;" the fact being, of course, that there is no 'increased price.' The price has been greatly reduced.

In several passages Mr. Bowker appears to commit himself to the belief that the taxation of all land, unimproved on the same basis as improved, is likely to be the chief method of raising revenue in the future. Indeed, he expressly says this on p. 138. That this will really be the outcome of the study of the problems of taxation, we doubt very much. Mr. Bowker's clear distinction between time-

wages and piece-wages (p. 161) should clear up a great many fallacies fondly cherished by some writers on the industrial situation. On the money question Mr. Bowker is explicit, but not as emphatic as we could wish in pointing out the evils attendant upon the continuance of the present silver-coinage policy of the United States. Perhaps, however, he did not feel justified in introducing too much polemical matter into an expository treatise. On p. 236 the author touches on a point which we believe to be of great importance, because it is an illusion which is very generally cherished; that is, the mistaking unproductive consumption for productive consumption. Nine persons out of ten seem to think that the people in general are benefited when a millionaire spends large sums of money in flowers, laces, and so forth, arguing that in such ways more money is put in circulation. Mr. Bowker says truly that "the wealth thus wasted would, more wisely used, furnish capital to many more people in creating more wealth." But he should have fully illustrated this point, using examples similar to those of Mill and Fawcett in treating this same topic. A chapter on this head would not have been out of place; and then a large supply of marked copies of the book might have been 'productively consumed' by mailing them to our national and state legislators, and to a select list of popular orators on economic subjects. We like particularly the final chapter in this book, entitled 'The end of the whole matter,' in which the author makes plain the truths that wealth is not an end in itself, and that economics is subordinate to ethics. The following passage, too, is very clear, and puts the question as to the limits of state interference on what we conceive to be the proper basis: "When the social machinery grinds out injustice, abuses men, makes the rich richer and the poor poorer, the community practically will not accept the extreme *laissez faire* theory; it will not let *ill* enough alone, but will apply factory acts to right wrongs. The evils that society has done, society must undo. On the other hand, the common sense also rejects not only the impossible communism which would reduce the industrious and the idle to a common level, but also the socialism which would put the greater portion of the social work under control of the state, instead of leaving it to individuals. Between the two lies the actual working social system, varying among different peoples and at different times, but persistently in accord with the underlying economic laws, and never for any considerable time, in any stable state, against them. This is controlled always by public opinion, the aggregate of individual intelligences, in its turn directed by education and

by the mastery of leadership. And thus the promotion of economic progress resolves itself into the work of political education" (pp. 262, 263).

It is well that Mr. Bowker has put in his subtitle, 'for use in business;' for it is a peculiar yet true fact that most business-men, though they use the terms 'capital,' 'price,' 'value,' 'money,' 'rent,' 'profits,' and so on, every hour of their working lives, have very confused ideas as to what they mean and imply.

A plain man's talk on the labor question. By SIMON NEWCOMB. New York, Harper, 1886. 16°.

Professor Newcomb's recently published talks also come under the head of economics for the people, though the subject treated is but one of the many touched on by Mr. Bowker. We should say that the chief fault to be found with this book is that the style is almost too conversational and too familiar for dignity. The talks were originally published in the *Independent*, and from their simplicity and directness attracted much attention. Advanced political economists and erudite writers on society and its phases may sneer at Professor Newcomb's bluntness and homely illustrations, but the ordinary reader will see their force. The illustration, for example, on pp. 44, 45, would be possibly unpleasant though profitable reading for 'walking delegates.' Chapter xv., entitled 'Another talk to a knight of labor,' is excellent, and can be safely recommended not only to members of that secret organization, but to others who find much to admire and little to criticise in its platform of principles. On p. 180 and the following pages Professor Newcomb disposes very neatly of the fallacy that waste creates wealth; but whether Mr. Powderly will break any fewer ginger-ale bottles in consequence of his perusal of it, remains to be seen.

CREMONA'S PROJECTIVE GEOMETRY.

PROFESSOR CREMONA'S new work on projective geometry makes an attractive appearance in its English dress. The characteristically English additions of the translator, together with the fact that the author himself has striven to imitate the English models, for which he professes great admiration, have had the effect to make the book quite indistinguishable, were it not for the title-page, from a book of purely English origin.

The volume before us has the common defect of not throwing sufficient illumination upon the great central points of the theory which it constructs, and of giving too much space (and too large type) to unimportant details. Another de-

The elements of projective geometry. By LUIGI CREMONA. Tr. by Charles Leudesdorf. Oxford, Clarendon pr., 1885. 8°.

fect is that there are hardly any examples left for the student to do by himself. Half the advantage of a course of mathematical study is lost if some facility in doing work of the same kind has not been acquired: and facility cannot be acquired without long hours of practice, any more than one learns to play the piano by listening to another person's playing.

Professor Cremona objects to the rather more common name of 'modern geometry' for the subject he is treating, that it expresses merely a relative idea, and that although the methods may be regarded as modern, yet the matter is to a great extent old. Neither objection seems to us very forcible. The characteristic of the modern geometry is its method, and not its matter, and the distinction between an ancient and a modern world has not yet ceased to have a real significance.

In all essential respects the distinguished author has accomplished his self-appointed task in an admirable manner, and English-speaking students will be very grateful to him for his labors. The presentation of the subject is admirably lucid and clear, the order is well chosen, and there are many simplifications of the more laborious processes of Steiner and Von Staudt. It is a good plan to make use of M. Ed. Dewulf's proof of the proposition that lines joining corresponding points of two projective ranges envelop a conic, but it is a mistake to let the proof of the most important proposition in the whole book rest upon one of the few passages which are printed in smaller type. The extent to which the subject is developed may be gathered from the facts that the sheaf of conics through four points is not reached, and that the existence of sixty Pascal lines is only mentioned in a footnote.

ARROWSMITH'S EDITION OF KAEGI'S RIGVEDA.

SANSKRIT scholars, and those who are familiar with the value of Professor Kaegi's 'Der Rigveda, die älteste literatur der Inder,' will be pleased at any attempt to throw the work into a form that will give it a larger circulation, and at the same time increase the interest in Vedic studies by bringing an introduction to them within the reach of general readers. As contributing to this end, Dr. Arrowsmith's translation of the German edition will be welcomed, since, to quote from the preface, it places "at the command of English readers interested in the study of the Veda a comprehensive and at the same time condensed manual of Vedic research."

The Rigveda: the oldest literature of the Indians. By ADOLF KAEGI. Authorized translation, with additions to the notes, by R. Arrowsmith, Ph.D. Boston, Ginn, 1886.

This is the end which the translation has in view; and it is from a popular stand-point, as appealing to English readers, that this new piece of work must be judged. In preparing the translation, Dr. Arrowsmith has chosen to follow the author throughout; and no claim is made to originality of thought or treatment, or to the contribution of any specially new material for the elucidation of the Veda. Bearing this in mind, it must be said that the translation, as a rule, is excellently made; and it would perhaps be hypercritical to pick out the few passages in which the English is not as finished as it might be, or where we have, perhaps, too close an imitation of the German idiom or word order.

In the metrical quotations from the hymns themselves, the translator, although having the Sanscrit text constantly before him, has generally adhered, as he says, closely to Dr. Kaegi's renderings; and the design seems to have been to give a readable version in popular form, rather than always a strictly scientific translation of the Sanscrit. Such being the case, we cannot look to these renderings for any thing original; but they carry out well enough the plan proposed.

The additions to the notes consist chiefly in a number of references to the more recent literature on the subject, thus bringing the book up to date; and though by no means complete, nor even professing to be so, they will prove very welcome and useful. The introduction of the 'Frog song,' on p. 81, is a good idea, and makes an acceptable addition to the book. It may be noted, in passing, that an improvement has been made by inserting at the end of each metrical translation the numerical reference to the *mandala* and *sūkta* from which the various verses are taken, instead of reserving such references for the notes. This will prove much more convenient in a general reading of the book.

The form in which the book is presented is attractive; but it is to be regretted that numerous mistakes should have crept in, not only in the Greek and Latin quotations and in the transliteration from the Sanscrit, but even in the English portions of the work. These we shall hope to see corrected in a future edition in order that they may not mar what is otherwise admirable in form.

In conclusion, we may say that by others beside the student of Sanscrit this book will be found interesting and instructive; and, with the exception of the notes, even the general reader will be interested in its perusal. It will also, it is hoped, render somewhat more general a knowledge of the Veda, and at the same time increase the interest now taken in oriental studies.

A. V. WILLIAMS JACKSON.